HOW TO TEACH DRAWING IN ELEMENTARY SCHOOLS

T. R. ABLETT

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BY

T. R. ABLETT

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PREFACE

In writing this little book, I have striven to show how the requirements of the Department may be fully met, with ease to the teachers, by means of the collective method of teaching, and with advantage to the general education of the children, by judicious choice of lessons.

It has gradually grown to its present proportions. The nucleus of the more practical part was written during the five and a half years that I was the Superintendent of Drawing to the School Board for London. The chapter on Drawing as a Means of Education has been slowly evolved. The ideas originated when I was Head-master of the School of Art of the Bradford Grammar School, and have developed side by side with the experience gained in various ways, as—

Member of the Council of the Bradford Technical College,
Examiner to the Science and Art Department,
Inspector and Examiner to the Girls' Public Day School Company,
Lecturer at the Training Colleges for High Schools,
Lecturer at the Home Education Society, &c.

These ideas took their present form in a paper, which I read at the Society of Arts, and the operations of the Royal Drawing Society of Great Britain and Ireland are founded upon them.

This book is written specially for Elementary Schools, and only partly illustrates the methods of teaching which are associated with my name in connection with Grammar Schools, High Schools, and others of similar grade.

T. R. ABLETT.

CONTENTS

HOW TO TEACH DRAWING
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INTRODUCTION.

It would be presumptuous in me to suppose that I could show teachers in elementary schools how to become more skilful in their profession. Still, I hope that in methods of art teaching, which have for years been my special study, I may be able to say something that will be found useful. I believe that on these teachers depends the great improvement in the drawing power of the industrial classes which is so much needed to enable England to compete on equal terms with its rivals. They have to deal with pupils at an age when the love of drawing is the strongest, and I have not the slightest doubt, other things being equal, that they will be able to produce results equal, if not superior, to those of the schools of any other nation.

It is not the fault of schoolmasters and schoolmistresses that the position of art teaching in the majority of our schools has not been one of dignity—that as a subject it has been generally classed with drill, or, as the gentler sex prefer to say, calisthenics, dancing, and other odds and ends, often regarded as beyond the range of serious pedagogics. Mr. Ruskin's influence has led men and women of culture to work at many out-of-the-way problems, but he has not induced school teachers to take up drawing, and it continues to be regarded more or less as the work of a specialist. So little is known of the

nature and scope of art studies that our schoolmasters regard them as making no tax on the intelligence, and, therefore, as having no bearing on the mental training of the young. Perhaps art teachers have been to blame. It may be that they have not appealed to the intelligence sufficiently in making choice of a course of study, or, that they have not brought out clearly the educational advantages of such teaching, but have insisted too much on mere mechanical accuracy, instead of working up interest and enthusiasm in the vital principles of art-work, and leaving the acquirement of mathematical precision to be the outcome of generous effort or the necessities of after work. Before entering into details as to methods of teaching, it may be well to point out the value of drawing from the purely educational point of view.

CHAPTER I.

DRAWING AS A MEANS OF EDUCATION.

There are several points of view from which the teaching of drawing may be regarded.

1. With some, it is an accomplishment by means of which the glowing landscape, or picturesque ruin, is copied from the radiant chromo-lithograph, and made ready for the hands of the frame-maker, by the united efforts of the pupil and drawing-master. This, by the way, is an unfortunate partnership, and morally indefensible, when the master does most of the work, and the pupil takes all of such credit as is to be had.

2. Others teach it as a method of improving design in manufactures—the South Kensington plan.

3. The Royal Commission on Technical Instruction recommend it to be taught as a necessary element in what is known as technical education.

4. The Royal Academy teaches it as a training for artists.

5. Drawing, taught as a means of education, is a view of the matter which, unlike the others, has received very little attention, and is little understood.

If, in explaining it, my remarks are not always acceptable to those who deal with drawing from the other points of view which I have mentioned, I feel sure that it will be granted that different aims necessitate different methods. My duties have brought me into connection with a multitude of schools, of all grades, for boys and girls, and also with studios, and schools of art, English and foreign. I affirm, without hesitation, that the methods employed for teaching artists and designers quite fail to meet the legitimate requirements of schools.

The kind of training adapted to adults who have special talent for drawing, or urgent necessity for the attainment of skill in its practice, is, on the face of it, not likely to be suited to boys and girls at school, of whom the majority have no special aptitude, and all have little time for practice. Drawing has hitherto been for the few, and the methods of the drawing teachers of the past, and to a great extent of the present, are unsuitable, because they have been developed merely for pupils possessing unusual ability. The intellectual processes are slipped over or slurred, because these pupils possess a sort of intuition that takes the place of conscious thought.

Before stating the advantages of teaching drawing as a means of education, it will be useful to consider how and by whom drawing is found to be helpful. For technical or trade purposes it is constantly used by artisans and mechanics, architects, engineers, military and naval men, advertisers, designers, and numerous others; for purposes of information, education, æsthetic gratification or culture, by geographers, astronomers, scientific men, statisticians, mathematicians, decorators, illustrators, and artists.

Artists may disclaim all connection with education, but scarcely with drawing, although one sometimes hears one artist say of another "he cannot draw." Many artists profess to know little of the use to which drawing is put by a number of the workers already mentioned; still, as a matter of general education, something should be taught of these various modifications of the art.

The late Right Hon. W. E. Forster once said to me about drawing:—"I tried at school, but I, and most certainly my master, had to give up the hope of my being taught." What was the kind of drawing which Mr. Forster tried to learn? Probably the aforesaid accomplishment.

Is it not a reproach to art teaching that its methods have

been so unintelligible, or wanting in their demand on intellectual effort, that a man of such distinction should have been able to make this confession? Is it not a reproach that at the present day, in many schools, drawing should be classed with dancing, and that there is a feeling in the community that the study of drawing is vague and unsatisfactory, and not to be classed with the purely intellectual, or absolutely necessary, studies? Not long ago the head-master of a large grammar-school, which I examined for the first time, said, in reply to one of my suggestions, "He could not permit progress in drawing to affect a boy's chance of promotion from one form to another."

Two things are necessary to raise drawing to a position of dignity in schools.

First, we must show that it may be made one of the bases of education, and one that all modern society owes to its children, whatever their avocation or their destiny.

Secondly, it must be demonstrated that it can be taught by collective or class methods as easily as reading, arithmetic, or any other school subject.

The educational advantages of teaching drawing are these:—

A. Educational drawing is valuable as a discipline for training and calling forth certain powers and faculties of the mind which can be developed, to their full extent, by it alone.

The advantages arising from its practice may be summarized as follows:—

1. *Perception of æsthetic influences is quickened.*—Beauty is its own excuse for existing, and as the outcome of æsthetic powers or faculties it is absolute good.

A well-taught student, of but average ability, is likely to produce better work than is possible to a genius badly instructed.

2. *Accuracy in observing and thinking is promoted.*—Drawing

has to do with form and certain realities of the material world which it expresses.

All the facts representing the form, dimensions, and natural or mechanical structure of an object can be given by means of drawing, for it is a mode of expression which is unequalled in its power of conveying or of fixing an accurate idea of an object. For this purpose it ranks next to the object itself.

The observation is cultivated because, in certain branches of drawing, every minute particular of an object must be carefully noted.

We are all apt to be deluded by our eyes. Unless the mind can deduce facts from their appearance, its impressions may be altogether wrong.

3. *The graphic memory is improved.*—Memory drawing obliges the observer to look at an object carefully and intelligently in order to enable the mind to gain correct impressions which may be retained as so much stored-up observation. The memory is brought into play in every act of drawing. Many artists can remember easily, because they have learned which are the salient points or features necessary for pictoric effect; and the best observers, outside the faculty, are those who have learned to fix in their minds the distinguishing or characteristic forms of faces, or places, and manifold other shapes of which it is useful to retain an accurate impression.

4. *The imagination is exercised.*—The mind must form a mental picture in connection with dictated drawing, also in designing working drawings of buildings, machinery, &c., but especially in composition connected with decorative or pictorial drawing.

5. *Free scope is afforded to the creative or inventive powers.*—Drawing transcends either written or spoken language in supplying adequate means for making inventive thought manifest. By its aid a perfectly accurate idea of any object, which

exists only in the brain of the designer or inventor, may be given.

To create or construct is one of a child's instincts which may be utilized with great advantage in its education.

6. *It combines training of the mind, the eye, and the hand.*—It is beginning to be understood that freedom of mind is to some extent dependent on freedom of body, that mental control is connected with physical control, and habit of mind with habit of body. If the senses and the muscles are led to form good habits, these will certainly react for good on the mind.

Quickness and cleverness in almost any kind of work depend on the extent to which the eyes and hand have been trained. Every vocation is made easier to those whose constructive faculties and perceptions have been highly developed.

7. *The powers of description are increased.*—The employment of precise language and nomenclature is to some extent necessitated by dictated drawing.

Drawing is a universal language. Not only is it a means of communication for those who speak the same language, but for all the civilized world. In its geometrical form it is written and read by inventors, engineers, architects, decorators, typographers, and others too numerous to mention. Through its power of representing the phenomena of nature, as they appear to the eye, it appeals in the most direct way to every human being. It enables the artist-poet to stir the emotions of all those who can appreciate beauty in form, sentiment and poetic feeling, whatever be their nationality.

Those who aspire to take a leading or even active part in the doings of this and the next generation must not calculate too much on the requirements of the past, since the world's drama is being played on conditions which rapidly change. They will need the fullest development of the resources of the body, the senses, and the mind. Without practice in drawing

this complete efficiency cannot be attained. Educationalists are beginning to find the curriculum of schools somewhat overladen, and already recognize that the various pursuits, instead of being several and independent, are mutually helpful. It becomes apparent that they are interwoven one with another, and may be taught in their relationships. When this is fully realized in practice, there will be less crowding instead of more crowding, and where there is antagonism we may hope for harmony. This movement may be assisted by showing how drawing can be interlaced with other of the school subjects, which are already recognized as essential.

B. Educational drawing facilitates the acquirement of other subjects.

Practice in drawing develops the intelligence and sharpens the perceptions. It helps the acquirement of spelling, it is most useful as a means of impressing some of the facts of arithmetic, geography, history, and science, and writing is learned most expeditiously if coupled with it. Drawing is one of the very best methods of training the mind at an early age, and some of its definitions are admirably adapted to the capacity of the young.

English spelling demands a power of remembering the look of words, since their sound is not always a trustworthy guide. Everybody has probably written down a word to see if it looked right. The improvement of the *graphic memory* adds to the capacity for learning to spell.

The arithmetic of space is taught by drawing, as the arithmetic of numbers is by figuring. Why should every child learn one and not the other? The arithmetic of space may be taught as soon as a child can use a ruler, and can understand something of drawing to scale. At first, it may well consist of drawing to scale, with the aid of a ruler, the common objects in a class-

room —such as the outlines of a door, a window, a black-board, an easel-stand, the walls, and the floor. It may be used to illustrate the methods of numeration. It is essential to the proper appreciation of the nature of a map. Fractions are made clear by its employment.

Again, the arithmetic of space may be used in learning many facts connected with geography, history, science, and other subjects. Facts, which in figures make no appeal to the mind, can be readily grasped by means of drawings, especially when they are made by the pupils themselves. When a child has to represent facts by means of drawings, it at once becomes plain to it that accuracy is of the first importance, and the difficulties of the drawing teacher are diminished to the extent to which this knowledge is acted upon afterwards in the mere copying of shapes.

The connection between writing and drawing needs no demonstration, although something has yet to be done to bring the fact into practical recognition. Why the pen should be put into the hands of very young children it is difficult to understand. We surely ought not to cramp the little fingers at the onset.

A child may be taught to draw before it is possible or desirable that it should learn to write. The formation of the script letters is a difficult and tedious piece of drawing; still everyone can learn to write, and therefore everyone can learn to draw, at least in a way advantageous to themselves.

So difficult is the drawing required in writing, that it is well to prepare for it by encouraging, as a preliminary step, the spontaneous efforts of early childhood, and the development of the senses of sight and touch. These senses must be carefully trained when they are most active—that is in childhood —or they will scarcely develop at all. The colour blindness of an adult, usually incurable, has arisen in very many cases

from the absence, at an early age, of the proper training of the perception of colour, and clumsiness with the hands is attributable to similar want of culture. The sense of sight may be trained to some extent by the judicious choice of a child's playthings. Building bricks, which form a constant source of entertainment, may be cut in lengths of 1, 2, 3, 4 inches, and so on; they may also be coloured. It is well to add coloured spheres, cubes, cones, cylinders, and pyramids to the set. Differences in length, colour, and shape will be noted in making selections for building purposes, and the distinguishing names will be learned incidentally, especially if the leader of the game calls for definite lengths, colours, or shapes. Only those who have undertaken to build in order to amuse children can appreciate the delicacy of manipulation that is often required.

A child's fondness for imitating produces in it a desire to make representations of things, which are attractive or astonishing, long before its mind is sufficiently developed to enable it to cope seriously with reading, writing, arithmetic, and kindred subjects. This desire to draw should be fostered and encouraged. Fond parents are too apt to imagine that these aspirations to draw, common to all, are the manifestations of great artistic genius. These efforts should be directed into channels which will greatly help forward an infant's education, but they are often left to die away, because there is a presumption that the child possesses an exuberance of ability in this direction, and that its time will be more profitably spent in some other way.

Children are by nature diligent students, and drawing furnishes the most delightful mode of describing the things which interest them. We can assist the development of a child's powers, by encouraging it to follow up its ideas, and by putting into its hands those materials which will most readily enable it to carry out its intentions. Whether it follows any definite

and logical plan, which someone has developed for it out of his or her inner consciousness, or whether it produces good drawings, is of little consequence so long as the faculties get scope for evolution and growth.

From a set of drawings, executed in this way by a boy between 3½ and 7, I have learned a great deal. Most of the drawings were made from the recollection of striking things. A locomotive engine and train has been drawn many times. One can trace a gradual growth in the complexity of the drawings, which is coincident with opportunities for observing the objects and their details.

The following is a list of some of the things drawn:—Steamer at sea; Greenwich Pier; a lifting crane; a train; designs cut out in paper, and coloured; a lighthouse; viaduct; volcano; church; Beachy Head, with Signal Station; balloon; railway bridge over a river, with train; pier, steamer, and rainbow; plan of Hastings; design for a house; shooting star; stained glass window; Metropolitan and District Railways; maps; aquarium and menagerie combined; plan of railway; plan of a farm; Barnes Bridge during the Oxford and Cambridge Boat-race; and an angel flying down to a ship. Of animals—a horse, cat, dog, cow—birds, and fishes have been attempted; a man, drawn from life; and a caricature of a man frightening a cat away.

The tedious methods of teaching writing, at present universally adopted, are terribly wasteful of the precious hours of school-life. The pupils feel little or no interest in what is simply a dreary discipline of copying lines. The time usually spent in learning to write amounts to something like 1½ years of school-life. Yet experience shows that it is quite possible to greatly reduce this time, by making the practice of the curves of the letters as charming to a child as its own spontaneous efforts to make pictures.

In such spontaneous efforts in outline-drawing, the very young use the method of making a line which is employed in writing. Each separate idea, or perception of form, is represented by one effort of the hand. In drawing a man, for instance, a circle is swept in for the head, an ellipse for the body, and a straight line for each arm and leg. The finished artist sketches on a similar plan, for each stroke is the record of one observation. Although there is good reason for the child's own method, yet we ignore it, and teach drawing to the very young by a method of making a line which is quite different to that employed in writing. It is not intended to underrate the value of sketched lines at certain stages of study by taking into consideration these facts.

The definitions employed in geometrical drawing may be taught quite early, as they do not present the same obstacles to the learner as those of most of the other subjects. For example, the definitions of grammar are subject to many exceptions, and it is extremely difficult to represent them as drawings which will appeal to the eye. They are mere abstractions of the mind, hard to understand and apply. The reverse is true of many of the definitions employed in drawing. They have no exceptions, they can be delineated so as to appeal directly to the eye, and, therefore, form an excellent means of introducing the nature of a definition to a child's intellect.

Such are the educational advantages which may be secured, in part or wholly, by everybody who can benefit by learning the other subjects of school work.

The capacity for learning to draw is just as widely diffused as the capacity for learning reading or arithmetic, and just as everyone can acquire some knowledge and skill in those subjects, so everyone can attain to some proficiency in drawing.

People who have not been taught to use the facilities which

drawing affords, have to go through life deprived of a very important means of communicating with their fellow-creatures. The interest in drawing which, by nature, children feel, should be cherished and encouraged so that it will continue throughout school life as a help to education, and that afterwards it may bear fruit in increasing the capacity for enjoying the beautiful in nature or in art, and making easier such art work as the vocations of life require. To be able to make a drawing of an object, showing its correct dimensions, is a power which everyone, at some time or other, needs to employ. Skill in this simple kind of drawing is, however, by no means common. Men and women of education and culture think it no discredit to have to call in the aid of a workman to do their measuring. The mistakes not infrequently made by the workman do not much disturb his serenity, however they may affect his employer, who has to bear the loss occasioned by them.

Drawing ought to be made an essential feature in every child's education. Too much must not be expected from the average pupil. Great excellence of manual execution cannot be attained by children. Many pupils have great intelligence, but little manipulative power; they can learn to draw in a way useful to themselves, and which aids the development of their faculties, but great excellence of workmanship is, with them, out of the question. Were manipulative excellence insisted upon at each stage, all energy and liking for drawing would be exhausted at the very first step. No one should be careless. The teacher may be satisfied if the pupil works up to the limit of his or her capacity. Where there is improvement there is hope.

Every youth should have a chance of showing his or her full capacity in each subject. It is pretty well known that children who are slow and inattentive in the usual school-work may still have special aptitude for music, drawing, or the like. They

should have a chance of distinguishing themselves in their own line without having to pass, as a preliminary, a difficult examination in other subjects for which they have little or no ability. Pupils of this description need careful management, as they are precisely those who lose interest and become listless if required to plod through a course of work which they find distasteful.

Perfection must not be expected in first efforts, however simple, and the development of mere manual skill should not be regarded as the chief end in view, the aim being rather to give that culture which requires the use of drawing as the means for conveying ideas. The drawing in which the teacher does all the thinking is of little value to the pupil.

Class or Collective Teaching.—The necessities of school management require that a large body of pupils shall be taught in mass, collectively, or as it is termed, in class. Languages, mathematics, and the like have for many years been made to conform to such treatment. In order that all may learn to draw from objects or casts, it is necessary to find methods that will make it possible for the teacher to demonstrate, as easily as a rule of arithmetic may be explained, the correct drawing of an object or cast, exactly as it appears to the eye of each pupil.

There is very little doubt but that good collective teaching is more beneficial to the learner than the method by which each individual is taught separately, and no doubt at all as to the economy in time effected. With collective teaching each member of the class is being taught during the whole of the lesson, whilst by individual teaching each pupil, even with good management, is taught for only a minute or two during the same period. In collective teaching the progress of one's neighbour acts as a stimulus or warning, and its system of question and answer displays the subject from more points of

view than would occur to any individual working alone. Lastly, the collective method greatly tends to make the teaching systematic.

Four conditions are essential to the complete success of collective teaching from objects or casts:

1. Good classification.

2. An object which all can easily see.

3. Approximately the same view of the object for all the members of the class.

4. A teacher well acquainted with class management and with the subject, and able to demonstrate the principles to be learned and methods to be followed with clearness and enthusiasm. Instruction without enthusiasm is scarcely worth the name of teaching.

As many of the class-rooms in which drawing is taught are small, the second condition is often impossible of realization. This difficulty may sometimes be got rid of, however, by supplying every pupil with a reproduction of the same card, object, or cast, and causing each example to be placed precisely in the same relation to the eye of each individual.

The teachers of drawing as a means of education.—Bearing in mind what has been already said, it is safe to say that the teacher must have a knowledge of the general principles of school teaching, skill in teaching a class by collective methods, and such a general education as will conduce to the due realization of the inter-relation of drawing with those school subjects which help it or are helped by it.

Such a teacher should be either a professional schoolmaster or schoolmistress, who has made a special study of drawing, or an art-student who has had a good education, and who has acquired a knowledge of the principles of school teaching and skill in teaching a body of pupils collectively.

Some people, especially some artists, laugh at methods of

teaching drawing. It would be just as wise for grown people, who read without effort, to ridicule method in teaching that art to children. The effort to learn to read is so great that anyone but a child is tired out by it, yet teachers constantly instruct forty to fifty children simultaneously, and in a comparatively short time they all learn to read. If good methods produce this result in reading, why may not good methods be found for teaching drawing? Many artists prefer to rely on a sort of divine geometry—which measures nothing and takes no heed of exactness in number and proportion—instead of using what may be named the geometry of man. If they teach, they say to beginners, Get a likeness; be only anxious about the masses; get the character or feeling of the model. If you fail to get your work right at once, clear the board and try again. But those experienced in the training of young people know that they must walk before they run, that they cannot draw as artists do, who have been years obtaining the skill which they display in a stroke. An experienced draughtsman can make up his mind what to do excessively quickly, almost unconsciously, but the beginner cannot proceed with the same ease. He must be furnished with methodical and connected exercises, which will bring him, in time, to judge proportions at sight, or almost instantaneously (see Book V., Ablett's Series). The finished artist, inexperienced in school teaching, forgets what he had to go through to acquire his power. There are artists also who cannot be called finished who have indeed but a very narrow idea of the range and resources of drawing, and it is these who are the most likely to wish for teaching. How many art students have been disheartened by the paradoxical way in which those artists who have not given themselves the trouble to think out and systematize their ideas deliver their dictums. Intelligent pupils get weary of a course of drawing, if they see that it

lacks the method and system which they find in other subjects. A good teacher keeps boys and girls enthusiastic by giving them enough to do, by making the work interesting, and by rousing their curiosity and their constructive faculties. Interest in a course of study is soon lost if there is any loitering, or if it is continued too long after the freshness of novelty has passed. We learn few subjects finally. Those which interest us, or which we find useful, we probably return to again and again as years roll on. Many promising pupils are spoilt by the favouritism or injudicious praise of inexperienced teachers. Praise should only be given for that which costs self-denial and application, and not for latent talent, which costs the possessor nothing.

The possibilities of communicating knowledge and skill in drawing are not so narrow but that they will amply supply an extended school-course. Drawing, well taught, should be an intelligent record of facts and impressions. There is as much, and a like difference, between a good and a bad drawing of objects, as they appear to the eye, as between an excellent and a wretched literary description. We cannot implant inventive genius and delicate feeling for art-work where the germs of it do not exist, but we can bring to the knowledge of a student something of the accumulated experience of past and present ages. There are certain processes, certain facts, of form, light and shade, tone, texture, colour, and elementary design, which form the elementary grammar of art, and these should be acquired to some extent by all, whatever may be the ultimate aim of giving such instruction. This grammar is capable of being taught systematically, like reading, writing, arithmetic, and the like. Just as these subjects are taught side by side, having each an allotted time, to large bodies of pupils, so may the different elements of drawing be taught.

An ideal course of study would be somewhat as follows:—

The drawing and colouring of anything that interests a small child.

Memory drawing, letter pictures, and writing.

Colour matching.

The use of the ruler.

Drawing to scale, with explanation of maps and diagrams.

The judgment (at sight) of length, proportion, height—compared with width, and angles.

Outline drawing from flat objects seen unforeshortened.

Use of colour in maps, diagrams, &c.

The elements of practical geometry.

Dictated drawing.

Statistical geometry, and the arithmetic of space, or the simple diagrammatic representation of statistics.

The difference between real form and apparent form, as exemplified by the easier straight-lined geometric forms, as found in common objects, and simple curves, lying in one plane.

The simple elements of solid geometry, as illustrated in plans, elevations, and sections of common objects.

General knowledge of the application of the various kinds of drawing employed to give information.

Representation in outline of common objects as seen by the eye.

Description in outline of the appearance of plants, and casts of fruit, vegetables, and animals.

The simple principles of light and shade as shown by contrast, reflected light, aërial perspective, tone and texture in connection with objects which are coloured the same throughout.

Many pupils could only, as teaching is at present, obtain the broad outline and general principles of such a course as

this. With the getting of so much, come the aforesaid educational advantages, such skill as is useful to everybody, and that intelligent knowledge of the rudiments of art-work which increases the power of appreciating works of art. The designer and the artist have too long been hampered by the want of knowledge on the part of the public. Cultivate the taste of every boy and girl, and it will become much easier for the art-worker to travel beyond the beaten track of obvious and commonplace conventionality.

Some pupils, with fair talent, will obtain that amount of skill which is the necessary preliminary step to the technical drawing of various professions and industries. Medical students who cannot draw are found to be heavily handicapped in competition with those who can.

It is unnecessary to mention the requirements of architects engineers, and the like. The individual who can draw with ease and accuracy, can gain skill in any kind of manual industry much more quickly than would be possible without such power. The drawing of an object is an excellent preliminary to the making of the same. The acquirement of accuracy in measurement produces habits of precision that directly lead up to skilful handicraft. The difference between the skilful and unskilful workman is mainly that the former fashions his products the exact size required, and the latter makes them wholly or in part too big or too little for their purpose, and so wastes time and material for which the employer pays. It has been said that nine-tenths of English workmen cannot understand a plan, elevation, or section. Waiting for the foreman's explanation increases the cost of production by wasting the workman's time.

Pupils who have decided talent for pictorial representation will lay a foundation upon which to build up, on leaving school, a thorough-going training in drawing, such as will

enable them to truthfully represent whatever is placed before them. So much power every artist should have as a preliminary to the painting of pictures. Poets, authors, musicians, dramatists, and painters all have a tale to tell, and each tells it in a way most suited to his faculties. We do not ask the poet to present his subject as an oratorio, nor the dramatist to develop his ideas with a palette and brush. We do expect a man when he has chosen by what means he will introduce his theme, to show acquaintance with and skill in the use of the medium of his choice. Indeed, so much is such skill appreciated, that many works of art support a reputation, not on account of the subject, but because of the technical skill displayed. There are pictures that delight artists, and no one else.

It is said by some that Englishmen are wanting in artistic feeling, and that it is no use wasting an art education on them; and others go so far as to say nothing can be hoped for in our climate. Yet we stand first in landscape painting, and in painting in water-colours we are still without an equal. Can the descendants of the men who built our cathedrals be without art feeling? When England and its rivals have reached that stage in educational development when nothing that can be done is left undone, then those qualities of invention and imagination which have given such diversity to our school of painting will enable us to carry off the palm.

If I have succeeded in making clear the importance to general education of teaching drawing to every boy and girl, it is to be hoped that fewer in the future will have to go through the world without the aid of that marvellous descriptive power which it affords.

The capacities of the young are a mine of wealth from which it is to our interest to extract the ore. The faculties which are chiefly exercised in drawing can be developed easily

in childhood, but with difficulty in adults. Let it not be said of us that we refused to work a vein of precious metal until all chance of working it successfully had passed away, for there can be nothing more depressing to a parent or teacher than that a boy or girl should, in after life, be able to point out wasted hours and wasted opportunities of school life.

I have, in this chapter, gone somewhat fully into the consideration of drawing as a means of education, because it is necessary to combat the idea that it is a mere mechanical art like writing. Unless drawing is taken into the curriculum of a school with a full appreciation of its value, there is great danger that the teaching will be less effective than it is capable of being made.

It has been said by a competent authority that the teachers in the elementary schools of Great Britain and Ireland are more skilful than those of any other country, and this, surely, is because they insist upon knowing the why and wherefore of any plan submitted to them.

This chapter gives the intellectual grounds upon which are founded many of the recommendations that I make in the following chapters.

CHAPTER II.

GENERAL PRINCIPLES OF TEACHING DRAWING.

The history of the teaching of drawing in the elementary schools of Great Britain and Ireland is well worth a passing notice, mainly because it will help to show how we stand at the present time, and what has led us into the position we now occupy.

It has been said that in the old days, before the First Grade Drawing was introduced, that the subject was taught more successfully than it ever has been in more recent years.

Probably there is some truth in the statement. The chief complaint against the First Grade work was that it was unattractive, and failed to arouse any enthusiasm on the part of the pupil.

In older times the boys and girls drew from pretty pictures of birds, animals, and other pleasing subjects which aroused enthusiasm and led to careful painstaking drawing. The fault of the old system was that it neglected the technical aspect for the purely pictorial or æsthetic side of drawing.

First Grade Drawing was instituted mainly to improve design in manufactures, and the course of work was chosen almost entirely without consideration for the purely educational aspect of the teaching, and next to none for the special necessities of instruction which is suited to the requirements of boys and girls.

The Royal Technical Commission took a view of the importance of the subject, which was stated by one of its members in Parliament when he referred to First Grade Drawing in these words: "With regard to the great question of drawing, which is really the foundation of technical instruction in this

country, drawing is not taught at all in three-quarters of the schools." The commissioners in their report recommended, "That rudimentary drawing be incorporated with writing as a single elementary subject, and that instruction in elementary drawing be continued throughout the Standards."

The present *Illustrated Syllabus* of the course of instruction in drawing under the Department of Science and Art is a great improvement on First Grade Drawing, for it contains a graduated course of work divided into portions to suit the different Standards, and it attempts to meet the requirements of technical education as well as those of the designer. But it does little towards making drawing a means of education.

In preparing the series of drawing books which bears my name, I have fully met the requirements of the Science and Art Department, and at the same time done something to make the exercises beneficial as a means of education, so that teachers may be enabled to make the most of the short time at their disposal, by killing two birds with one stone, in accordance with the old adage.

The title of this little book, "How to Teach Drawing in Elementary Schools," will doubtless be understood to mean "How to teach drawing in elementary schools successfully."

Two things are essential in order to gain a full measure of success—

1. *The adoption of collective methods of teaching a class.*
2. *A course of work that will interest and attract the learner.*

Collective methods of teaching drawing have hitherto been used in connection only with a few subjects for which they were obviously suited, such as Geometry, Perspective and sometimes Freehand. Since I took up the question of teaching drawing in elementary schools, my chief work has been to develop and invent collective methods of teaching judgment at sight, memory drawing, dictated drawing, freehand, model

drawing and shading. Special difficulties were met with in dealing with model drawing, but I feel sure that if the directions given in these pages are properly followed, it will be found just as easy to teach these subjects by collective methods as it is to teach other branches of school work to large classes.

To interest and attract the learner, we must lead him or her by easy gradations, from the simplest forms to the more difficult, we must call into play the intelligence, and above all things give occasional exercises that specially appeal to the youthful fancy. No pupil will attain to much skill unless some delight akin to enthusiasm is called forth by the work. The charms of colour are specially attractive to young people. Colouring has therefore been introduced into this course of work wherever practicable. Simple shading takes the place of colour in the earlier exercises. Colouring and shading, besides being attractive, are useful in calling attention to the relative size of spaces or masses, a matter which is generally overlooked by those who practice merely from uncoloured outline copies. Colour is used to simplify the meaning of a drawing. For this purpose it has long been employed in maps, machine and architectural drawing, and in the preparation of scientific and other diagrams.

The delineation of objects themselves is more interesting, and more likely to give real power in drawing, than the copying of copies. Wherever possible the objects and apparatus in and around the school-room have been introduced, in this series, as models for various kinds of drawing. Various ways are indicated for carrying that practice still further, as in using flat objects, such as kites, fans, palettes, for freehand copies, and in the arrangement of bricks to form examples for practice in drawing to scale.

As the interest of both pupils and teachers is stimulated by an occasional change, a number of new forms have been supplied for freehand and other practice, and these copies have,

as far as possible, been taken from common objects known and understood by children.

We must call into play the intellectual powers of the pupils. Drawing has been too long regarded by schoolmasters and schoolmistresses as a mere mechanical art. This was the fault of the teachers of drawing of the past. They let it be understood that it was of no use for anyone to come to them who had not a very special aptitude. Their favourite pupils gained knowledge and skill by a sort of intuition, so that it was never found absolutely necessary to place the methods and principles of art on a systematic and scientific basis that could be demonstrated to every intelligent person. Schoolmasters and schoolmistresses, finding a want of intelligible principles, naturally concluded that drawing was a mere trick of the hand and eye which could not be taught to anyone to whom it did not come by nature. This idea has been fostered by those people, especially some artists, who laugh at the notion of finding methods of teaching drawing to everyone.

The drawing of the Illustrated Syllabus requires that every individual shall be taught. It would be folly to persist in the use of methods that can appeal only to the exceptionally gifted. It will be requisite to make our teaching of such a kind that any intelligent child, whatever be its capacity for pictorial art, will be able to understand the why and wherefore of the necessary processes, so that it may be able to gain a serviceable power in their employment although it may never attain to the manipulative excellence of a born draughtsman.

Drawing from objects, or model drawing, may be reduced to very simple principles. Many teachers are unsuccessful with the subject because they do not clearly demonstrate the simple conditions that regulate the delineation of objects as they appear to the eye. The pupils never learn the exact position of the picture plane, and the proper use of the pencil when it is

held between the eye and the object. A sheet of glass or glass plane (see p. 71, also Book 8, Ablett's Series), when properly used to represent the Picture Plane, will show the conditions so clearly that the dullest can understand them. The Glass Plane proves the general principles of model drawing by actual experiment. When these are thoroughly understood the teaching becomes comparatively easy, especially if practice be given from large objects, like a window, door, top of a table, &c. Small objects do not show, sufficiently, the apparent difference between lines of equal length placed at different distances from the eye. The perspective that is learned by experimenting with the glass plane, and by the use of a small piece of apparatus (Object Drawing Help) which can be manipulated by each pupil, is a much more useful help to model drawing than book perspective, like that named Second Grade. Book perspective can do little to show the difference between the real and apparent shape of curves. I have been able to describe a method (p. 99) which I specially designed for the purpose, and which makes this difficult part of the subject clear to everyone. It forms a stepping-stone between the drawing of straight-lined objects and curved-lined objects.

Geometry (Plane and Solid) and Drawing to Scale appeal most strongly to the intelligence when their practical application is shown. Plane Geometry may be connected with pattern drawing and Freehand. The principles of Solid Geometry should be taught experimentally by actually making drawings from an object on a horizontal and vertical plane when placed in their proper relation to the object. The teaching should not be confined to drawing plans and elevations of cubes, prisms, and the like. It should sometimes be given in connection with common objects and from measurements made in the presence of the class.

The Drawing to Scale, which is taught by making drawings

of objects measured up before the children, will take a firmer hold on their minds than the working of problems from a book.

Shading from models and casts may seem to be a subject not reducible to principle. With an extensive experience in teaching it to a class, I have no hesitation in saying that no branch of art-work can be more scientifically demonstrated.

Not only can the processes of drawing be made plain to every intelligent person, but the faculties which are called into play in its practice may be given a preparatory sharpening.

The acuteness of the perceptions can be increased in every person, and the finer the appreciation of the length, proportion, and inclination of lines, the greater will become the capacity for making good drawings. The systematic training of the eye to judge at sight should go on side by side with the early practice of delineation. There has been little or no attempt, hitherto, to give such training, although it is quite feasible, as is shown by the wonderful acuteness displayed in various avocations—for example, the sailor's power when on look-out duty, the wool-sorter's skill in distinguishing between scores of different fibres that, to the unpractised eye, seem to be precisely the same, and the professional billiard player's power of judging angles. By means of the Sight Trainer, described elsewhere (Book 5), effective collective teaching of this kind can be given to a large class.

The appreciation of shape is much refined by the practice of *Memory Drawing*, whose special province it is to cultivate a habit of accurately observing. It is of great importance, since the memory is brought into play in every act of drawing, and defective memory is the result of bad observation. By the representation of curves or shapes which are first observed without being drawn, and afterwards drawn when hidden from view, accurate observation is made an absolute necessity, for the pupils are obliged to look carefully and intelligently in order that the memory may retain that which is seen in the form of

stored-up observation. It is a tradition among us that we can believe our eyes. Practice in memory drawing often dispels this idea, and demonstrates the fact that some training is necessary before the eyes can be considered at all trustworthy. When the mind has received through the eye a correct impression of a shape, it will have little difficulty in guiding the hand to make faithful representation of it.

The hand has less to do with good drawing than some people think. Memory Drawing is useful in connection with Writing, Freehand, and Drawing from Objects or Model Drawing.

Dictated Drawing sharpens the intelligence by accustoming the pupils to work solely from verbal directions or orders; it necessitates the use of a precise nomenclature between teacher and pupil; it forms a good examination test, and is an effective method of teaching drawing to a large class.

I take *Freehand* last, because success in it requires less intelligence than is required in Model Drawing, Geometry, Drawing to Scale and Shading. Success in it depends very much upon the acuteness of the perceptions whose training we have just considered.

The intelligent way of drawing a Freehand copy is that by which the general proportions and leading curves are first drawn. Then, the chief features having been correctly indicated, the smaller parts are fitted into their proper places, and finally the lines of a careful drawing are cleaned and made clear. By the unintelligent method some portion of the detail is laboriously drawn without any preliminary mapping out of the proportions, spaces, and main curves. This latter plan may be likened to railway making which begins to cut and tunnel without any preliminary survey of the country through which the line has to pass: it is simply an example of want of forethought (see directions for making a copy, Book 7, inside cover).

CHAPTER III.

GEOMETRIC OR TECHNICAL DRAWING.

As geometrical drawing is that which all elementary schoolmasters and schoolmistresses can learn to teach, it follows that it is that which the vast majority of children can learn. On this account, and because it will be more useful in after life than any other branch of drawing by reason of its technical bearing, and more helpful to other school work, I propose to consider the teaching of this subject first. Of the twenty books which comprise Ablett's Drawing Copies, fifteen contain some geometrical drawing.

1. THE SIMPLE USE OF A RULER.

1. *Manipulation.*—Each pupil must be provided with a nine-inch or a foot ruler, on which one or more inches are divided into twelfths and some into eighths, and the half and quarter inches are shown. The teacher must be provided with a ruler marked in inches. The T-square may be thus marked, or a slip like the blade of the T-square.

Show, by placing a foot ruler on the black-board, that the first and second fingers of the left hand must be placed near one end, and the thumb near the other, in order to press it firmly down when drawing a vertical line. Also let the pupils, at the word of command, hold the rulers diagonally, or up and down the slates or pieces of paper. For ruling lines across, the fingers only should be used to hold the ruler.

With a long piece of chalk, cut at the end like a chisel in shape, show how the pencil must be held so that a line may be ruled exactly where the ruler touches the black-board, as in

Fig. 1. It must not be held so as to leave a space between A and B, as shown in Fig. 2.

Let the pupils rule lines at the word of command, across, diagonally, and up and down the slates or pieces of paper. When they can handle the pencil fairly well and hold the ruler firmly, the Exercises 1–29, Book No. 1. of Ablett's Series for the Standards, should be executed. By ruling over the thin lines of the slate-card or ruled exercise book the pupils get accurate notions of direction and shape at the onset.

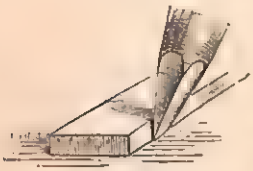


Fig. 1.

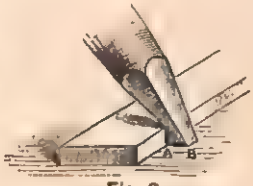
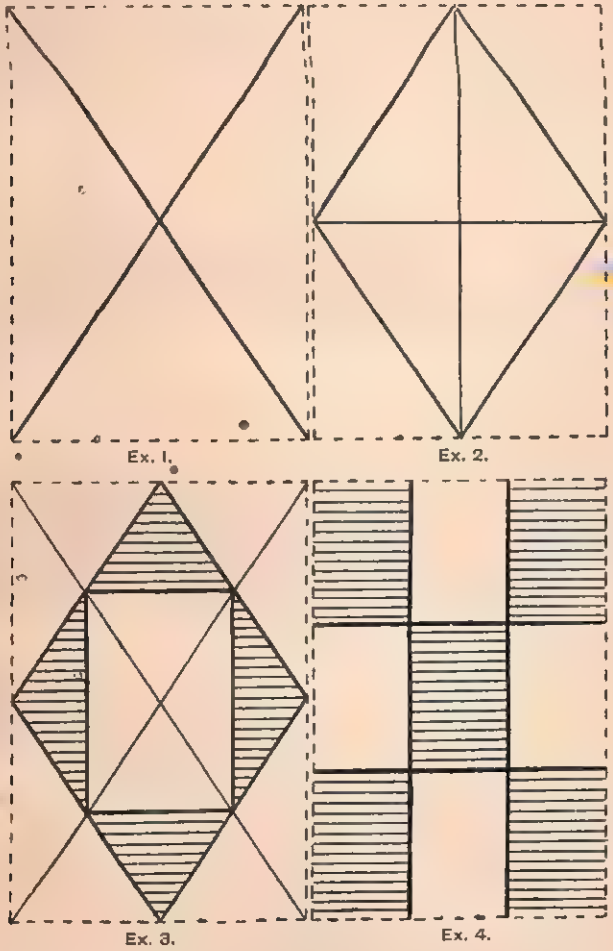


Fig. 2.

2. *Ruling Parallel Lines.*—The term "parallel" need not be used or explained at present. See that a line is ruled straight across each slate, of some given length—say five inches—and that a given distance—say three inches—is marked directly under each end of it. Between the two points thus marked see that a line is accurately ruled. A number of similar exercises must be given in which the inch division only should be employed. The parallel lines may be placed, on the slate, in any position already practised. Constant illustration must be given by the teacher. Every new step should be drawn in the first place on the black-board. It is very necessary that the black-board should be placed on the easel as the slates are placed on the desk. If the length of the slate runs with the length of the desk, the black-board should be similarly placed on the easel, and so on with any other position. Work the Exercises 30–37 of Book No. 1., Ablett's Series.

3. *Exercises in Ruling.*—The following exercises are designed to be worked on a slate or piece of paper eight inches long by

six inches broad. Instead of these, Exercises 38–49, Book No. 8 may be worked.

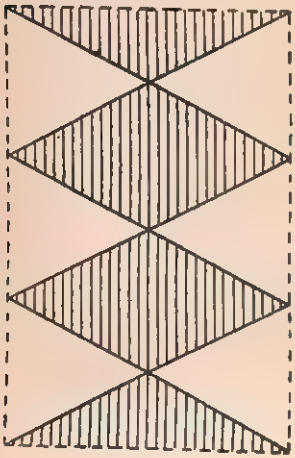


(N.B. —The dotted lines indicate the edges of the slate in each exercise.)

Exercise 1 is the simplest, and Exercise 12 represents the

most difficult that should be given. If these exercises are not found sufficient, others of a similar character may be intermixed with them.

Exercises 1, 2, 3, 4, 5 should entirely fill the slate. The teacher should show how to work out the pattern by using a slate held before the class. One line at a time should be first measured and then drawn, and the scholars should follow step by step, working on their own slates. A little careful instruction will enable the pupils to do the shading fairly well. The teacher, having ruled two lines on the black-board, as in Fig. 3, will, with the free hand, draw the line at *a* as it ought to be done, and then point out, by drawing lines at *b*, *c*, *d*, and *e*, the faults in beginning and leaving off to be avoided.



Ex. 5.

In Exercise 6 the distance *a b* ($2\frac{1}{2}$ inches) is first marked on both sides of the slate, beginning at the top; *b c* is ruled; *b d* (1 inch) marked off; *d e* (4 inches) measured; *f* and *g* measured 4 inches below *d* and *e* respectively; the sides of the square *d*, *f*, *g*, *e* ruled; the diagonals *d g* and *f e* ruled; *d h* (1 inch) marked off on the diagonal, and similar distances from *f*, *g*, and *e*; the inner square is completed, and finally the spaces are shaded.

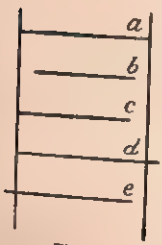
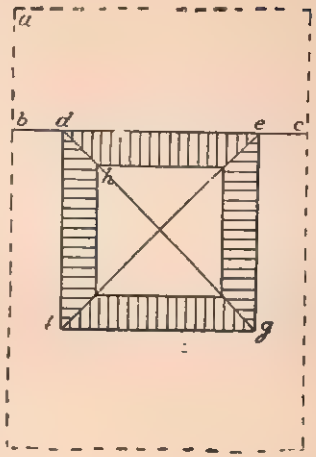


Fig. 3.

In the rest of the exercises the marks ″ will indicate inches. In Exercise 7 first mark off the points *a*, *b*, *c*, *d*, and join *a c* and *b d*. Measure *a e*, *e f*, *f g*, *g h*, on both these lines, and rule

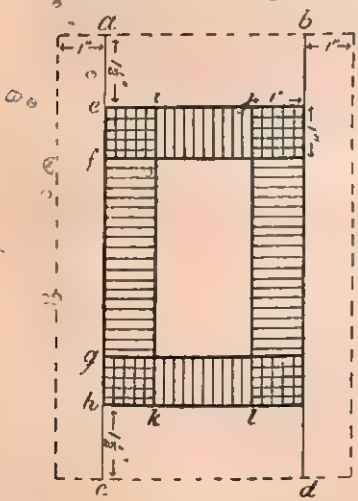
lines across. Measure off and mark i, j, k, l, and rule $i\,k$ and $j\,l$. Shade.



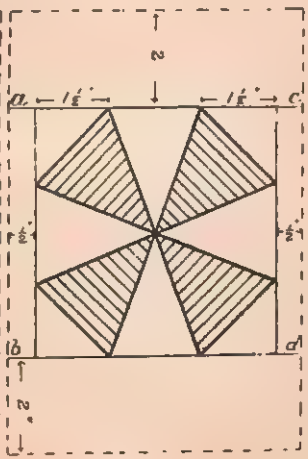
Ex. 6.

In Exercise 8, measure off and mark points a, b, c, d, and rule lines $a\,c$, $b\,d$. On these lines measure off $\frac{1}{2}''$ from each of the points a, b, c, d, to mark the points of the square. Rule the remaining sides of the square. Mark off ($1\frac{1}{2}''$) from each corner of the square, and rule the lines of the shaded figure.

In Exercise 9, measure off a, b, c, d. Rule $a\,c$, $b\,d$. Measure off points e, f, g, h. Rule $e\,f$, $g\,h$. Measure off the points of the shaded figure, and complete it.



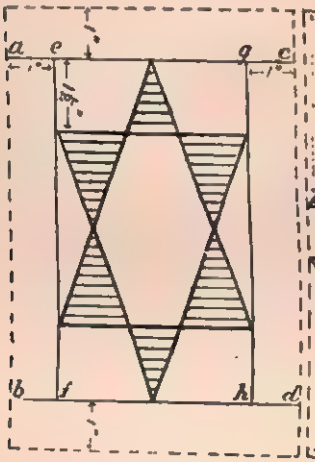
Ex. 7.



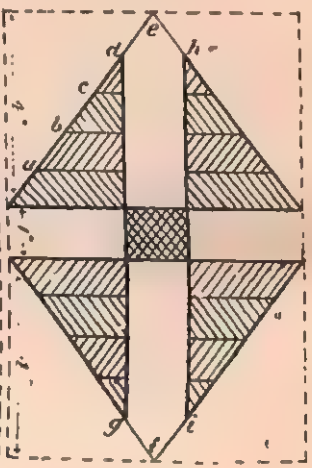
Ex. 8.

In Exercise 10, measure off (4″) from the top and bottom of

the slate on both sides, and rule two lines across it. Measure off *e* and *f*, the middle points of the top and bottom of the slate. Rule the line *e*, *d*, *c*, *b*, *a*, and the three similar lines. Measure off *e d* (1″), *c d* the same, and the other similar distances like it. Rule *d g*, *h i*. Rule lines across from *c*, *b*, *a*, and from the other points similar to them.



Ex. 9.



Ex. 10.

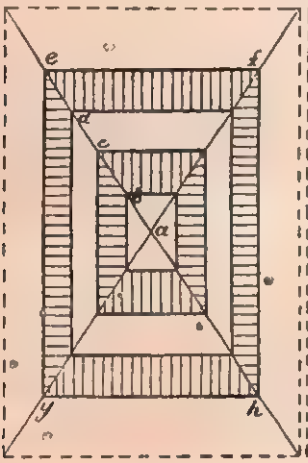
In Exercise 11, rule the diagonals. From *a*, measure off points *b*, *c*, *d*, *e* (1″) apart. Mark off similar distances on the other diagonals. Rule *e f*, *g h*, *e g*, *f h*, and then the other lines, to complete the figures.

Exercise 12 is very simple, but needs to be accurately ruled. Divide the top, bottom, and sides of the slate into inches. Rule the lines across, and then the vertical lines. Rule the diagonal lines. Shade the pattern, and finish by ruling the outlines of it rather darkly.

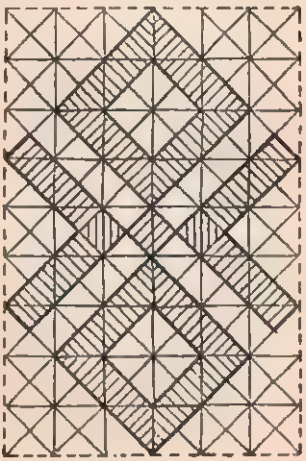
4. *Vertical, Horizontal, and Oblique Lines.*—Hold a rod in an upright position on the floor before the class, and tell the pupils that a line in this position is named a *vertical* line. See

that a line is drawn straight down each slate to represent the rod, and instruct the pupils always to show vertical lines in that position on the slate or paper.

Call attention to the fact that the surface of still or tranquil water is always quite level; that a good floor is always quite level. Hold a rod parallel with the floor, and tell the pupils



Ex. 11.



Ex. 12.

that a line in this position is named a *horizontal* line. See that a line is drawn straight across each slate to represent the rod, and instruct the pupils to show every horizontal line in that position on the slate or paper.

The teacher should stand facing the class, and hold a rod so that one end will be on the floor and the other sloping towards his or her right-hand side. The pupils must be instructed to rule a line from the left-hand top corner of their slates or paper to the right-hand bottom corner to represent the rod. Standing in the position above described, the teacher should then hold the rod sloping towards his or her left-hand side. To represent this, the pupils must be instructed to rule a line

from the right-hand top corner of their slates or paper to the left-hand bottom corner.

The pupils may be told that these latter lines are named *oblique* lines. It is not of great importance that these names should be taught at this early stage. In deciding whether they should be mentioned or omitted each teacher must use his or her discretion. The names inserted in Book No. 1 are not intended to be learned unless the pupils are capable of mastering them. It is, however, of the greatest importance that pupils should well understand in what position, on paper, lines of different direction are pictorially represented.

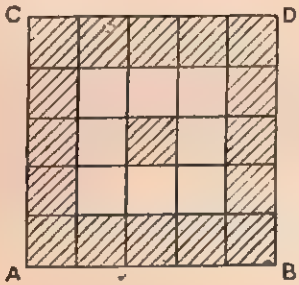
That the work which has been indicated up to this point may afford good training, great care must be enforced in all the measuring and ruling. If at any time an exercise is found to be rather beyond the scholars, the teacher should go back to simpler ones, such as those the pupils have already mastered. The great secret of getting good work from young children will be found in giving simple directions, one at a time, and in seeing that each one is carried out by the whole class before another is attempted.

Some skill in marking off inch and half-inch divisions has been given in the work of Standard I. In the drawing for Standard II. it will be necessary more frequently to mark off halves and quarters of inches.

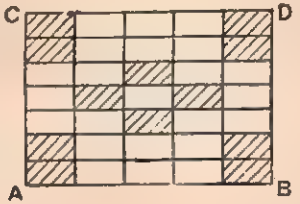
2. THE USE OF A SET-SQUARE.

Rule a line A B across the paper, low down on it, and 5″ long (Ex. 13). Mark the inch divisions. Press down the ruler with three fingers of the right hand. Place the set-square on the upper side of the ruler, with the second finger of the left hand in the hole in its centre, and its hypotenuse on the left. Move the set-square until its edge comes to point A. Place the first and third, as well as the second finger of the left

hand on the set-square, and the thumb and little finger of the same hand on the ruler. Keep all firm and steady. Rule a line A C the length of the edge of the set-square. On the line A C mark off five 1″ divisions. Place the ruler so that its edge (not the bevelled edge) touches A C. Place the set-square against it so that its upper edge gives a horizontal line. From all the points in A C rule lines across the paper with the set-



Ex. 13.



Ex. 14.

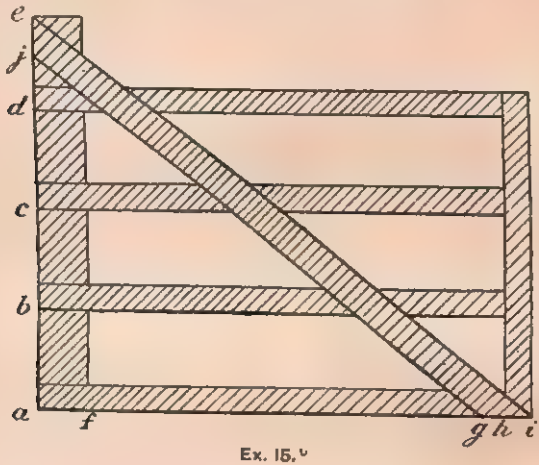
square, rather longer than A B. In the same manner, with the set-square rule lines from the points in A B parallel to A C. Shade.

Great care must be exercised in seeing that the scholars hold the ruler and set-square in such a way that they will not shift when the lines are being ruled. The set-square cannot always be held as above described. The right, or left, or both hands will need to be employed under certain circumstances. It will be necessary for the teacher to demonstrate on the black-board the various methods of manipulation as the necessity for their use arises. See page 1, Book 18, Ablett's Series.

In Exercise 14, A B is divided into five 1″ divisions, and A C into seven half-inches.

Exercise 15 represents a gate drawn $\frac{1}{2}$″ to 1′ (′ = foot or feet). Rule *a e* 4′ long. Mark off *b*, *c*, *d* 1′ apart. Mark off $\frac{1}{4}$′ above *a*, *b*, *c*, and *d*, respectively. Rule all the cross lines. On the

line $a\,i$ mark $a\,f$ $\frac{1}{2}'$, $g\,i$ $\frac{1}{2}'$, and $h\,i$ $\frac{1}{4}'$. Rule lines upwards from f, h, and i. Join $e\,i$. Mark $e\,j$ $\frac{1}{2}'$ and rule $j\,g$.



Ex. 15.ᵇ

The Exercises in Book No. 2 should now be worked, and the set-square used whenever required.

3. EASY DRAWING TO SCALE.

See also Book 9, Ablett's Series.

Measure a book, the cover of which is less than 9″ by 6″, and rule its dimensions accurately on the black-board, using the ruler and set-square. The scholars will find that they can make, on their paper, a drawing of the cover of the book shown on the black-board by ruling lines of the same length as those drawn by the teacher. It is supposed that they are using a slate, or piece of paper, $10\frac{1}{2}$″ by $7\frac{1}{2}$″ (outside).

Stand two slates side by side against the black-board. They will be found, including the frames, to measure 15″ by $10\frac{1}{2}$″. Make a drawing of them, the actual size, with ruler and set-square, on the black-board. The children will find that they have not enough room on their slates to mark 15″

or $10\frac{1}{2}$". As soon as they have discovered this, tell them to use half-inches for inches.

In their drawing they must put $7\frac{1}{2}$" for the longer side, and $5\frac{1}{4}$" for the shorter. At the bottom of the slate all should write a note of this kind:—"In this drawing, half an inch is used to show one inch."

Nothing has been said about drawing to scale, because explanations would be likely to confuse. All that these young people need know, at present, is the practical way of overcoming the difficulty of representing an object larger than their slate or paper.

It is necessary to place in a vertical position those objects which are to be represented in the same way as the slates, so that the vertical, horizontal, and oblique lines may be drawn as taught early in this chapter.

This work is Solid Geometry in its simplest form. In it we draw the elevation or projection on the vertical plane of objects having two dimensions, and which are placed parallel to the vertical plane.

As it is difficult to mention any one object which is always to be found in an elementary school, and which is invariably of the same dimensions, I select a modulator, 2 feet broad by 4 feet 9 inches long (exclusive of rollers), as likely to be most frequently at hand. This should be carefully measured in presence of the children, and its true dimensions, as in the case of the slates, drawn on a black-board, or on two black-boards placed side by side. Tell the members of the class to make a drawing of it themselves, using an inch to show a foot. Their drawing will actually measure 2" by $4\frac{3}{4}$". At the bottom of the slates this note should be written:—"In this drawing, an inch is used to show a foot."

Measure the wall in front of the class, or other large right-angled object which is a definite number of yards long or

broad. The children should use an inch to show a yard, and, when the drawing is finished, write a note stating this, as before.

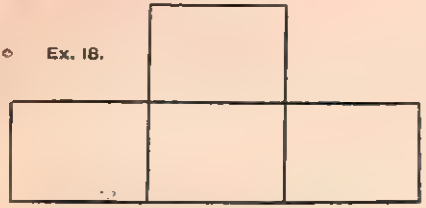
By working numerous examples like the book-cover, slates, modulator, and wall, the scholars will learn to employ an inch to show a yard, an inch to show a foot, a half-inch or a quarter of an inch to show an inch, a foot, or a yard, as the case may require. When considerable experience in this practical work has been gained, they may be told that the drawing of objects, greater or less than their real size, is called "Drawing to Scale," and that they may shorten the writing at the bottom of the slate by simply putting "Scale, an inch to a yard," and the like.

Some difficulty will arise in finding objects having only right angles, and which are a definite number of yards or feet in length and breadth. The teacher should measure a number of the flat objects in the class-room when the children are not present, and select those which have no odd inches or half-inches over and above the feet or yards. Anything that is 5′ 5½″, for example, gives trouble; for, if an inch be taken to represent a foot, how will the way to show 5½″ be made easy to children? If the odd inches be 3, 6, or 9, there is not the same trouble, as a quarter, a half, and three-quarters of an inch represent them respectively.

Ex. 16. Ex. 17.

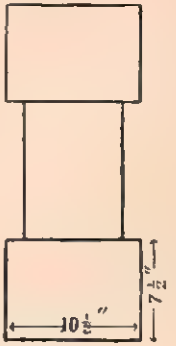
The opening in a wall for a door or a window is regulated

by the arrangement of the bricks. Enlargement upwards is always 3″ (the thickness of a brick with mortar), or a multiple



Ex. 18.

The long edges should be 5½ eighths of 1 inch; the shorter edge, 3¼ eighths of 1 inch.

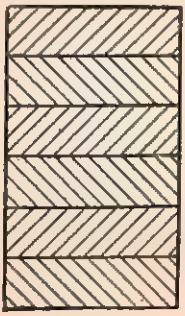


Ex. 19.

of 3″; and increase in width is by 4½″ or 9″ (the half or whole length of a brick), or a multiple of them. If the school is well built and furnished, the measurements of similar things will be found uniform, excepting a slight variation due to the contraction and expansion of the materials, caused by heat and cold, dryness or damp.

In a cheaply-built school, a great deal of irregularity will be found in making measurements. Unseasoned wood expands or warps much more than that which is seasoned, and bad workmanship shows itself, among other things, in inaccurate dimensions.

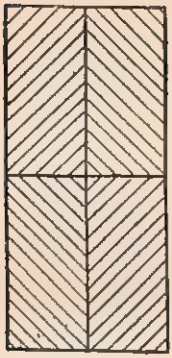
Every opportunity should be taken to impress upon the scholars the waste and inconvenience which arises from inaccurate and careless measuring.



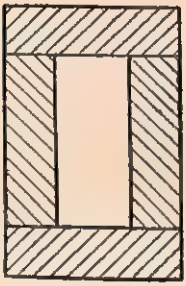
Ex. 20.

Ex. 21.

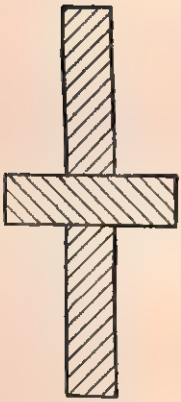
The following twelve exercises will be found useful, and should be given by measuring the objects when they are placed before the class:—



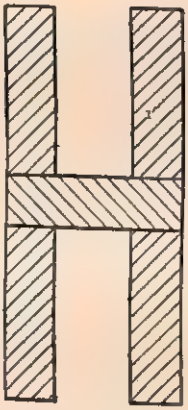
Ex. 22.



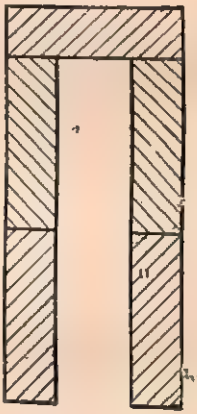
Ex. 23.



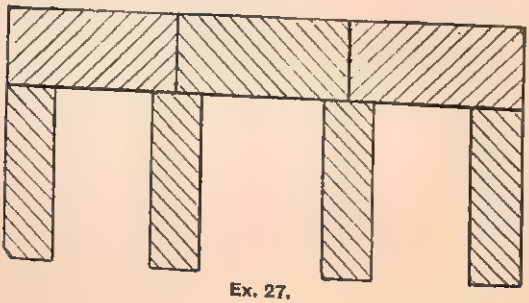
Ex. 24.



Ex. 25.



Ex. 26.



Ex. 27.

Exercises 16 and 17 are taken from two black-boards placed together. Each board is actually 3 feet by 4 feet. They are here drawn to a scale of $\frac{1}{4}''$ to 1′. The children should draw them by using 1″ to show 1′.

Exercises 18 and 19 represent slates placed in front of a black-board, and resting on a piece of wood laid on the pegs of the easel. The outside measurement of each slate is the same as the one figured. They are drawn in the illustrations to a scale of $\frac{1}{16}''$ to 1″. The children should draw them by using $\frac{1}{4}''$ to show 1″.

Bricks are easy to get, and are pretty uniform in their dimensions—$8\frac{1}{2}''$ long, 4″ wide, $2\frac{1}{2}''$ thick. Exercises 20 to 27 are taken from bricks built up before the children. In the illustrations they are drawn to a scale of $\frac{1}{16}''$ to 1″.

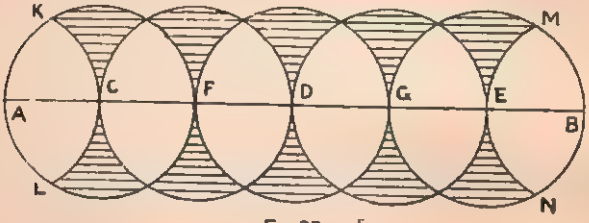
The scholars should draw Examples 20, 21, 22, and 23, using $\frac{1}{2}''$ for 1″. They might draw Examples 24, 25, 26, and 27, using $\frac{1}{4}''$ for 1″.

SIMPLE PLANE GEOMETRY AND DRAWING TO SCALE.

The use of the Compass.—The use of the ruler and of the set-square has been taught already. The compass completes the set of instruments absolutely needed in geometrical drawing. A compass for a child's use should be as simple and strong as it can be made, consistent with lightness. A plain screw, which can be tightened by an ordinary screw-driver, should unite the two legs. That the steel point may not be easily bent out of shape, it should be made stout almost to the end. The compass pencil should be held by a steel spring sheath which will grip it tightly. A screw, which will, sooner or later, be sure to be lost or destroyed, is not needed. Teachers will be saved much vexation, and the class great loss of time, if the above matters are attended to in obtaining instruments. A good disciplinarian instinctively foresees and eliminates all

the causes of friction, between himself and the pupils, which he possibly can.

The teacher, holding a large compass, should demonstrate on the black-board the way in which it is used. With respect to the position of the hand, it should be pointed out that the thumb should be placed on one side and two fingers on the other of the cylinder where the legs meet. No pressure must be put on the legs, or the distance between them will be



Ex. 28.

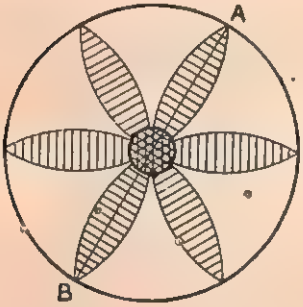
diminished. Children constantly lose their measurements or distances in this way, if not warned. When the body of the class can hold the compass properly, the teacher should show how the steel point may be kept firmly in one place whilst the pencil is revolved. A little drill in revolving the compass, without allowing the pencil to touch the paper, will be useful. Lastly, the pupils may be allowed to describe some large circles. Notwithstanding a rapid consumption of paper, it is advisable to allow first exercises to be worked on a large scale, as accuracy is more attainable than in working on a small scale.

As success in geometric drawing depends a good deal upon the amount of skill, which is developed in the use of a compass, a number of interesting exercises should be given in the form of patterns.

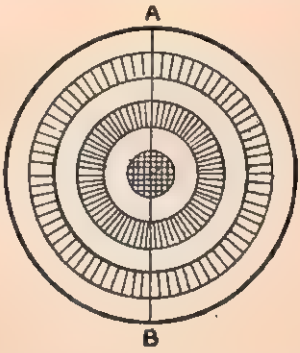
Exercise 28 should be worked on a large scale upon the black-board. The teacher should work it bit by bit before the class, and the pupils should follow step by step. Draw

A B six inches long (teacher uses half a foot for an inch), and mark the inch divisions. From the middle point D describe a circle 1″ in radius. Describe circles of the same size from points C and E. From F and G describe similar circles. From centre A describe K C L, and from B arc M E N. Shade the spaces to make a pattern.

In Exercise 29 the circle is to be $1\frac{1}{2}$″ in radius, though the



Ex. 29.



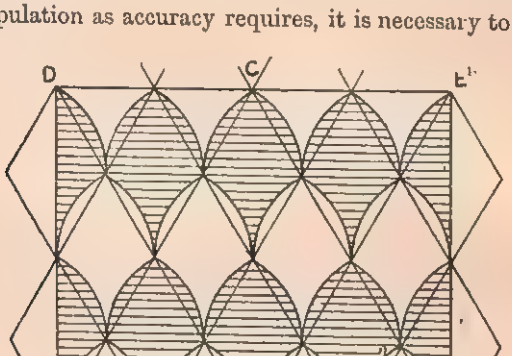
Ex. 30.

teacher should make it $1\frac{1}{2}$′ on the black-board. Draw the diameter A B, and with the radius divide the circumference into six parts. These points are the centres from which to describe the arcs forming the petals of the flower. The small circle in the centre is $\frac{1}{4}$″ in radius. Shade.

In Exercise 30 describe the circle as before. Draw diameter A B. Mark $\frac{1}{4}$″ divisions on radius. Describe the inner circles, beginning with the largest.

Having gained skill in describing a circle, and in striking an arc, the pupil will be able to draw an equilateral triangle and a hexagon, and, with the lengths of the sides and diagonals given where necessary, an isosceles triangle, a scalene triangle, a rhombus, a rhomboid, a trapezium, and an irregular polygon.

These names, and others of like kind, should be defined and taught as they are required. It is not to be supposed that because all the definitions are put at the beginning of books on geometry they are all to be learnt at once. In Book 12, Ablett's Series, the definitions are mixed with the text, and are only seen when first wanted. To induce young pupils to take such pains in manipulation as accuracy requires, it is necessary to interest



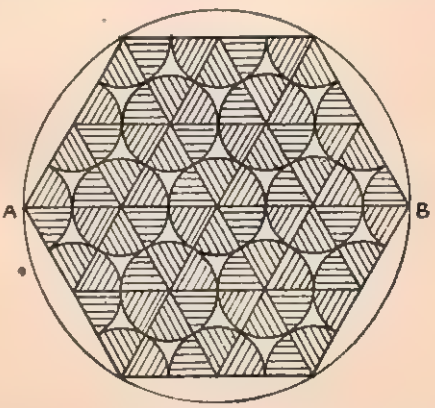
Ex. 31.

them by making geometric drawing attractive. The following exercises will be found useful in this respect, since they illustrate some of the methods by which geometric design is produced. In executing them, careless work will cause the pupil so much additional trouble, and produce such unsatisfactory results, that it will be found to bring about its own cure.

In Exercise 31 the teacher will represent A B as 2′ and instruct the pupil to draw to a scale of 2″ to 1′ in his drawing. Draw the equilateral triangle A B C. Divide each side into four equal parts with the ruler. Rule the diagonal lines, using the set-square to get them parallel to the sides of the triangle and produce them beyond the triangle to the right and left. Draw A D and B E with the set-square. Join D E. Complete

the requisite number of diamond shapes. Strike the arcs to make the pattern. Shade.

The more careful boys, for home-work, may be allowed to colour the pattern with flat washes, as in mapping. Colour has great attractions for young people, and its use should be allowed as a reward. It is well to mention again that colouring with flat washes is used by machine draughtsmen to distinguish the different metals and materials used, and thus it makes their intricate network of lines, simple reading. In architectural drawing, and in the diagrams of science, colouring is of similar value.

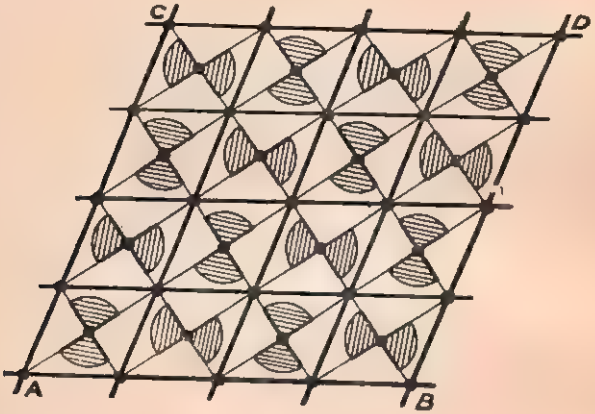


Ex. 32.

In Exercise 32 the teacher draws AB 2′, and the pupils use a scale of 3″ to the teacher's 1′. Describe the circle. Divide the circumference into six parts with the radius. Draw the hexagon. Draw all its diagonals. With the ruler divide each side into two equal parts. Rule the lines, marking out the equilateral triangles. Describe the circles. Shade or colour.

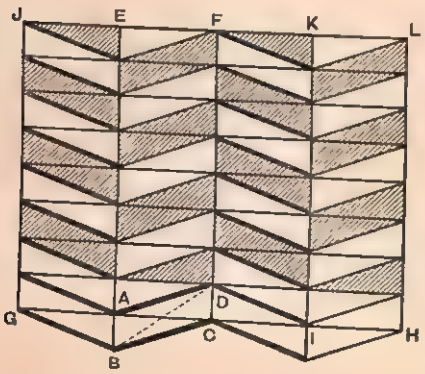
In Exercise 33 the teacher draws CB $2\frac{1}{4}$′, and AB, AC 2′ each. The pupils use a scale of $1\frac{1}{2}$″ to the teacher's 1′. Draw the rhombus ABDC, beginning with CB. With the ruler divide each side into four equal parts. Rule the lines parallel to the sides. Rule the diagonals. Describe all the arcs. Thicken the radii. Mark the dots at the angles of each rhombus and at the centre of each circle. Shade or colour.

In Exercise 34 the teacher draws A C as 3″, and D C as 1″. The pupils draw to a scale of ¼″ to the teacher's 1″.



Ex. 33.

Draw B E. Mark off A C, and complete the rhomboid A B C D. Rule F C and G H. Measure off with the ruler A G, C I, and I H = to A C. With set-square rule J G, K I, and L H. On the vertical lines mark off distances = to A B from G, A, C, I, H. Complete all the rhomboids. Rule the horizontal lines. Shade, and be careful to preserve the relation between the thick and thin lines.

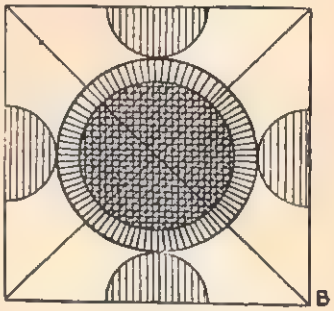


Ex. 34.

The teacher must keep the pupils following step by step in order that they may not become confused.

Exercises similar to the above may be introduced, with advantage, all through a course of Plane Geometry. See Book 12 and Book 18, Ablett's Series.

It is a mistake to put children through a long course in working problems, like that of the Second Grade, without showing some practical applications after each new set of problems is taught. Where possible the principles of geometry should be shown to be correct by practical experiments. For example, all the angles of any triangle are said to be equal, when taken together, to two right angles. This is capable of easy proof. Cut out various-shaped triangles in paper, and then cut off and put together the angles of each one in order to show that the three combined are equal to two right angles.



Ex. 35.

Dictated Drawing.—This sharpens the intelligence, by accustoming the pupils to work from verbal directions or orders; it necessitates the use of a precise nomenclature between teacher and pupil; it forms a good examination test, and is an effective method of teaching drawing to a large class. The following exercise may serve as an example. The pupils must not be shown the drawing until they have completed their attempt from dictation.

(1) Draw a horizontal line A B $1\frac{1}{2}$" long, Exercise 35. (2) Above it from A and B draw two vertical lines, each of the same length. (3) Join the extremities of the vertical lines to form a square. (4) Mark the middle point of each side of the square with the ruler. (5) Place the points of the compass $\frac{1}{4}$" apart, and from the middle point of each side describe half a

circle, within the square. (6) Rule the diagonals of the square. (7) Describe a circle so that it will just touch the semicircles, using the point where the diagonals cut as centre. (8) Using the same point as centre, describe another circle with a radius of $\frac{3}{8}$".

(1) Shade the semicircles. (2) Shade the smaller circle twice as dark. (3) Shade the ring between the circumferences of the larger and smaller circle with lines running towards the centre.

Dictated exercises of varying difficulty may be made out to suit the work of any particular class. See Book 6, Ablett's Series.

SIMPLE SOLID GEOMETRY OR ORTHOGRAPHIC PROJECTION.

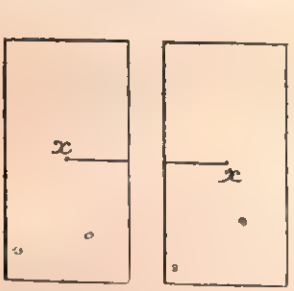
Plane Geometry deals with figures which have length and breadth only. Solid Geometry represents, with the same accuracy, objects which have thickness as well as those which have length and breadth. Strictly speaking plane geometry is but a branch of solid geometry, since its scope is confined to the representation of plans of figures having dimensions in one plane.

Solid geometry is the fountain from which springs machine drawing, architectural drawing, and the other forms of the graphic language of the workshop. This is a universal language; the only one in which an interchange of ideas can be made between workmen of different nationalities who cannot understand a foreign tongue. It is a medium by which we can communicate our ideas or wishes to a skilful workman in a way that will enable him to produce the article we require without the necessity of personal instructions.

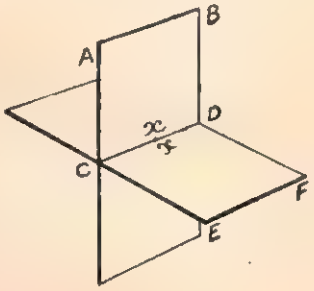
When children have been led to understand these practical bearings of the subject it will be found quite easy to interest them in the acquirement of its simple principles. Practically

I have found them show more interest in this work than in that of plane geometry. Much depends, however, on the method of giving the instruction. It is a great gain to know when to stop in making an explanation. Sometimes a teacher may be heard to give a demonstration quite sufficient for the purpose, and *then* to supplement it by a rigmarole which confuses that which was at first made clear.

It is well to show practically the nature and position of the



Ex. 36.



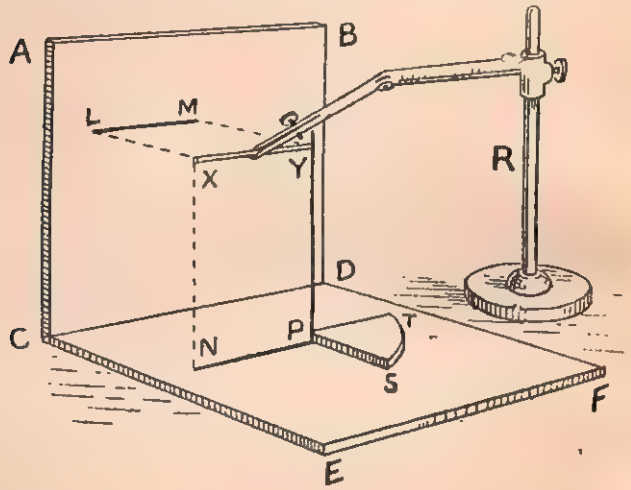
Ex. 37.

intersecting planes. This may be readily done by slitting two large oblong pieces of stiff paper, as in Exercise 36, and by placing them together so that their centres x coincide as in Exercise 37.

Remember to point out that only a portion of the planes is represented by the pieces of paper, and that the planes are of unlimited extent. The upright one is termed the vertical plane and the other the horizontal plane. A plane is a perfectly level surface, like the top of a pool of tranquil water. All planes that are in the same direction as the top of the pool are horizontal planes. Those which stand straight up, or perpendicular to horizontal planes, are vertical planes.

In representing a solid object two drawings of it are executed, one on the vertical plane and one on the horizontal plane. To show how these drawings are made, two portions of the

vertical and horizontal planes lettered A B, C D, E F in Exercise 37 should be taken. They may be represented by two small blackboards hinged together, or by two pieces of cardboard hinged together by pieces of tape or calico pasted at the back and front of the junction, or, as it is termed, the intersecting line. Having placed the two planes in position, bring the object between them,

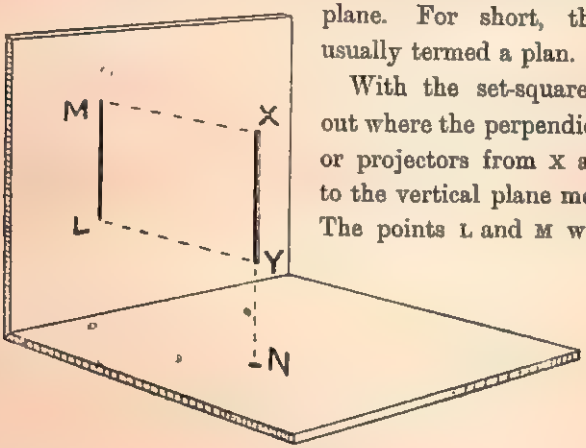


Ex. 38.

fix it in a certain position, and proceed to show how the two drawings are made.

In Exercise 38 the method of giving a first lesson is shown. Instead of a solid, a straight line X Y is placed in a fixed position by means of a stand R. The line is parallel to both planes. The line between Y and P represents an iron rod fastened to a triangular piece of wood, P T S, so that it will stand perpendicular to the surface on which the piece of wood rests. This little piece of apparatus is a kind of set-square, and thus I will describe it. By placing the rod of the set-square against Y the point of the triangle at P shows where a perpendicular drawn

from Y to the horizontal plane meets it. Mark the point P. With the set-square show where the perpendicular from point X meets the horizontal plane, namely in N. Join N P and we get a representation of X Y on the horizontal plane. The perpendiculars from X to N and Y to P are named projectors, and the drawing N P is named a projection on the horizontal plane. For short, this is usually termed a plan.



Ex. 39.

With the set-square find out where the perpendiculars or projectors from X and Y to the vertical plane meet it. The points L and M will be obtained. Join them. The line L M is said to be a projection on the vertical plane, or, for short, an elevation.

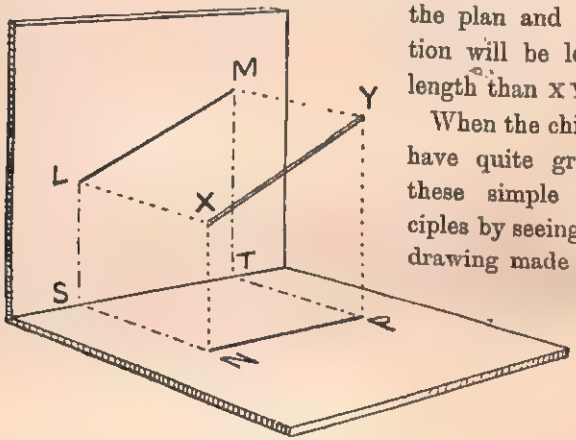
As a second example, place the rod X Y in a position perpendicular to the horizontal plane and parallel to the vertical plane, as in Exercise 39.

The rod of the set-square will touch X Y throughout its length, and there will be but one projector terminating at point N, which will form the plan. The set-square will give two projectors to the vertical plane, terminating in M and L respectively. Join M L, and we obtain the elevation of X Y.

As a third example, place the rod perpendicular to the vertical plane and parallel to the horizontal plane. The elevation will be a point and the plan a line.

In the next place show how it is that the plan and elevation are sometimes represented by lines shorter than the line which is being drawn.

In Exercise 40 the plan N P is shorter than X Y, but the elevation L M is the same length, because X Y is parallel to the vertical plane. If X Y is placed obliquely to both planes, both the plan and elevation will be less in length than X Y.



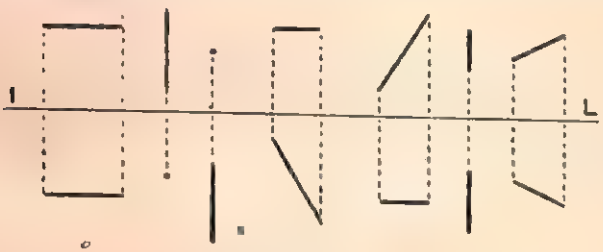
Ex. 40.

When the children have quite grasped these simple principles by seeing each drawing made practically, the rod may be held in various positions between the two planes, and they may be required to say what will be the character of the plan and elevation in each case, as in Exercise 41, where a rod six inches long is used throughout.

In Exercise 41 the planes and elevations are shown on one piece of paper. I L represents the intersecting line, or line where the planes meet. The portion above it represents the vertical plane, and that below the horizontal plane. The dotted lines on the vertical plane represent the projectors drawn to the horizontal plane, as L S represents X N and M T represents Y P in Exercise 40. The dotted lines on the horizontal plane represent the projectors drawn to the vertical plane, as S N for L X and T P for M Y in Exercise 40.

This should be carefully explained to a class, and may easily be done by swinging the two pieces of cardboard into one plane after each drawing, so that the crack between them will represent I L in Exercise 41.

The North of England School Furnishing Company, Darlington, manufacture two black-boards hinged together with arrangements which hold the boards at right angles for the drawing to be made, or fix them in one plane, as in Exercise 41.



Ex. 41.

The rate of progress of the scholars will depend very much upon the grasp they get of the simple principles already considered. Two or three lessons will not be thrown away on this part of the work. Plane figures and rectangular solids may be dealt with in the same way. Fix the object between the two planes and find the leading points of the plan and elevation with the set-square. When each drawing is complete, move the boards into one plane and show the plan and elevation on one surface. After each figure is demonstrated by the teacher it should be drawn by the scholars. The following order of dealing with the models may be observed:—Square, cube, rectangle, prism, with square or rectangular end (brick), triangles, polygons, circle, and ellipses.

The sections of such solids as the cube and prism with a rectangular end do not present much difficulty. The great thing is to show the pupils the actual shape of the surface

exposed in cutting the section. Trace this shape on paper, and draw the plan or elevation of the cut-out shape without reference to the solid. When the pupils understand how to deal with the section by itself they will find no difficulty in representing it in connection with the solid.

Soft clay may be used to make a model of a cube or prism. This can be cut with a large knife, and the exposed surface shown to the class and then traced by applying it to the paper and running a pencil round its outline. For constant and ready use small wooden models (solid and of soft material) may be cut in various pieces, tightly attached, and parted or severed in that particular direction which will show the section required.

Circular solids, like the cone, cylinder, pipe and sphere, should be dealt with after the prisms and pyramids, which have a triangular or polygonal end. The French sometimes use skeleton models made of wire for the higher geometrical work. By means of these the development of the cone from a right-angled triangle and the cylinder from a rectangle, and the like, are shown by revolution. Skeleton models, to some extent, help to show the nature of sections.

Simple Scales.—In these it is not advisable to include the scale of chords or the diagonal scale, which are scarcely required by young people. Simple scales will present little difficulty if good instruction has been given in drawing to scale by the methods indicated in former articles, and in connection with the Solid Geometry.

It is a most useful practice to provide a drawing with no scale marked on it, and to require the pupils to discover the scale from the distances or measurements figured on it.

CHAPTER IV.

DRAWING FROM MODELS IN CLASS.

It is unnecessary for me to dwell long upon the importance of model drawing. In its practice the pupil first tastes the delight of being in possession of a power of description which is, in many cases, far beyond that which words can supply. Drawing has been said to be a universal language, for by its means a clever artist can set down wonderful effects and delightful combinations of form in such a way as will rouse the emotions, which he feels, in the breasts of those who cannot understand his words, but who see his pictures.

We find that Model Drawing has not been a favourite subject in many elementary schools. Teachers, as a rule, have discovered that they cannot get so good a result in the examination in this subject as in Freehand and Geometry, though they devote the same time and energy to all. To get at the reason for this, I have given the matter most careful consideration for some years.

I find that most elementary teachers have too slight an acquaintance with vital principles, because they themselves have not been taught by the best methods. Besides this there are serious practical difficulties to contend with in teaching model drawing in an ordinary class-room. Model drawing may no longer be taken or left alone at the discretion of the teacher. All those who intend to teach drawing must be ready to deal with this branch of it in the best possible manner.

The only way to properly understand the following remarks is to draw the objects in the positions indicated, and to read this text as the drawing is made according to the instructions.

The principles explained are still more fully illustrated in Books 8, 11, 14, 17 of Ablett's Series.

1. *Position of the Models.*

Because the groups set in the South Kensington examination have hitherto been placed below the level of the eye, the large majority of teachers never show the method of drawing an object placed above it. It should hardly be necessary to point out that models placed low down cannot be properly seen by more than half the members of a medium-sized class, and also that in the majority of objects around us many lines are above the level of the eye. Those who never teach drawing from objects above the level of the eye, or which have some of their lines above it, ignore many important principles. For the efficient instruction of a large class in ordinary class-rooms, *the models need generally to be placed on or above the level of the eye.*

If the model or object is placed directly in front of the class, it will be necessary for the teacher to give three separate demonstrations—one to the children on the left-hand side, one to those on the right-hand side, and one to those in the centre.

It would be found, I think, that it is no rare occurrence for a teacher thus to treble his or her labour. One demonstration only is needed if the model be placed in the extreme left or right of the space in front of the class. See Chapter I. p. 23, the conditions to be observed in collective teaching.

2. *The simple conditions to be observed in making a drawing of an object as it appears to the eye.*

(*a*) Objects with surfaces in a number of different planes must have all their lines represented on one plane. This plane, in the eye, is the retina, but in drawing it is an imaginary plane—named the picture plane—placed between the eye and

the object. As the lines would appear on this picture plane so they must be put on the sheet of drawing-paper which represents it. Great economy of time is effected if a sheet of glass be placed in the position of the picture plane, and a tracing of the object be made on it.

(*b*) The head must remain in one position. Any movement gives a different view, but one view only is represented in this kind of drawing.

(*c*) One eye only is to be used, as each eye gives a different view. To prove this, tell the children to look at the right hand at first with the right eye, and then with the left. The right hand should be held about a foot in front of the right eye, so that only the first finger is visible when the hand is open and vertical. The left hand, which meanwhile has been covering the left eye, should be removed to the right eye, and the left eye will see not the first finger *only*, but one side of the other fingers as well.

(*d*) The eye must look in a direction parallel to the surface of a horizontal plane. If the actual height of the eye above the floor, or ground, is marked as C.V. on the model or object, half-way between the extreme point on its left-hand side and right-hand side, and the eye looks at C.V., its direction will be correct. Should the object be quite above or quite below the level of the eye, the aforesaid point C.V. may be marked on a vertical rod in front of the object. See Fig. 14, X Y.

(*e*) The position of the picture plane (represented by the glass plane) must be vertical, and at right angles to the line between the eye and C.V. This may be stated in another way, by saying that the picture plane must be so placed that the line between the eye and C.V. will be perpendicular to it.

It is very necessary that a teacher should be thoroughly acquainted with these simple conditions.

The true position of the picture plane is not at all clearly under-

stood. Some persist in thinking that it ought to be parallel to the desks in a class-room. This idea seems to have been handed down as a tradition, because, in the early examinations, scholars were required to make a drawing as though one side of the object were parallel to the picture plane.

The position of the picture plane entirely depends upon the position of the eye, and that is fixed in a way best suited to the object, or objects, to be drawn.

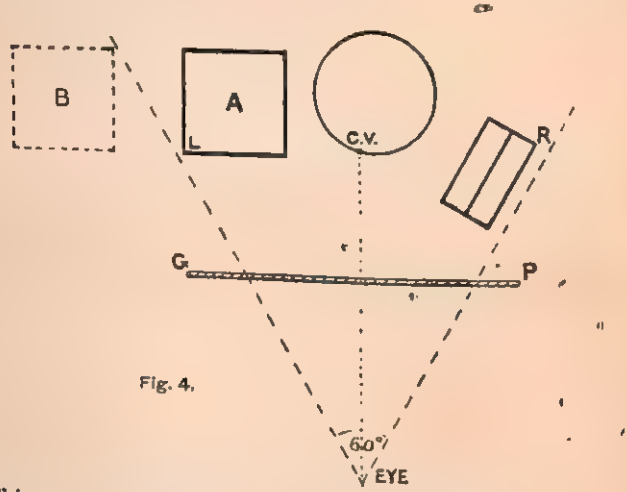


Fig. 4.

This matter is illustrated in the following figures:—

Fig. 4 shows the plans of two cubes, a cylinder and a prism. C.V. is marked on the cylinder to show the height of the eye from the ground. The eye looks at C.V., because a cube (A), cylinder, and prism are to be drawn, and C.V. is half-way between L and R, the extreme points of the group. The glass plane, shown in plan as G P (picture plane), is placed at right angles to the line between the eye and C.V. The cube with the dotted plan (B) cannot be included in the drawing, because it is outside the range of vision. The range of vision is formed by a cone of rays (shown in plan in Fig. 4 by the dotted lines

radiating from the eye), with an angle of 60° at its apex and the line from the eye to C V for its axis. The apex of the cone passes into the pupil of the eye. C V is, therefore, the centre of vision.

In Fig. 5 the cube A is to be drawn alone. The eye, which

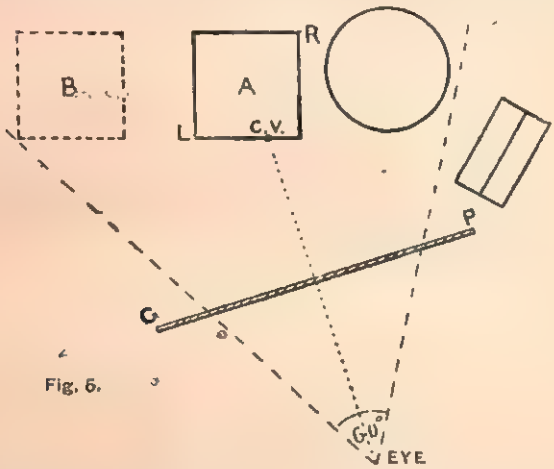


Fig. 5.

remains in the same position, is, however, revolved in part to look at C V (now placed near the middle of the cube A), and the glass plane must also be moved. A drawing of cube B and the cylinder might be included with that of A, but the prism could not be drawn, as it falls without the range of vision marked by the disconnected lines converging from the eye.

Fig. 6 represents the cube A as it would be drawn under the conditions of Fig. 4, where one of its sides is parallel to the glass plane.

Fig. 7 represents the cube A as it would be drawn under the conditions of Fig. 5, where none of its sides are parallel to the glass plane.

Thus it will be seen that, from the same point of view, an object may be drawn either in parallel perspective or angular

perspective, according to the direction in which the eye looks. The direction of the eye in Fig. 4 was fixed to suit the whole group, and in Fig. 5 to suit cube A specially.

If a class of children are taught that the picture plane is parallel to the front desk, many will have to draw the object when it is far outside their range of vision, for they must look in a direction at right angles to the picture plane and not at the object. When acting as Examiner for the Science and Art Department, a batch of model drawings sometimes came under my notice, so much alike that it was difficult to say whether they were drawn from an object, or were a reproduction from memory of one of the drawings made on the black-board by the teacher at some lesson. The head-master of a school once told me that out of two hundred candidates which he sent in, only one passed. Some radical mistake with respect to the position of the picture plane was, no doubt, the cause.

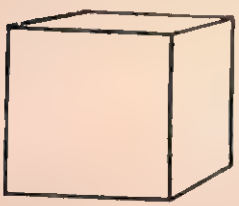


Fig. 6.

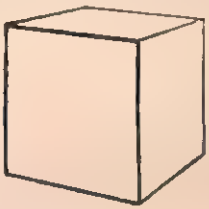


Fig. 7.

In giving a course of lessons, we should begin with the largest available objects, so that the apparent difference in the length of equal lines, placed at unequal distances from the eye, may be readily detected by measuring with the pencil on a long rod provided for the purpose. Cubes, cylinders, prisms, and the like are not suitable for first instruction—partly on account of their small size, and partly because they are objects not familiar or particularly interesting. Our present system of teaching this subject is calculated to lead to the belief that it is a mysterious process, only to be employed in representing odd-shaped figures made specially for the purpose. We

should seek to make drawing a real power, by encouraging its employment, from the first, in delineating the objects of everyday experience.

3. *First Lessons.*

After devoting some time to the practice of holding the pencil at arm's-length in order to compare the relative dimensions of lines drawn by the teacher on the black-board, our first lessons should be from objects of two dimensions, placed vertically at the right or left hand of the class, and may be of such a kind as this:—From a position near the middle of the class, trace upon the glass plane, with yellow black-board chalk, ordinary white chalk, soap, or Chinese white, a map-sheet, hung rather high on that part of the side wall in front of the class.

N.B. To ensure that the tracing is large, put the glass plane as near the object as you conveniently can and fix the eye-piece as far from the glass plane as is possible. Arrange that the converging lines shall meet on the glass when produced.

Allow the pupils to file round and see that the lines of the tracing coincide with the outlines of the object. When the pupils have returned to their places, point out the differences that exist between the tracing and the map-sheet itself. If this is not always convenient select six pupils to verify the tracing, but it is worth the trouble to let each pupil see the fact, even if it is done as the pupils leave school.

(Drawing to Scale may very advantageously be connected with the early stages of Model Drawing. Before this tracing is made the teacher should measure the map-sheet, in sight of the pupils, and make a drawing to scale of it on the black-board. The pupils will then have before them the real shape of the map-sheet to compare with the apparent shape, which is shown by the tracing on the glass.)

Show, by measuring, that the lines on the glass plane which represent equal lines are unequal, and that the lines which represent parallel lines appear, when produced, to converge

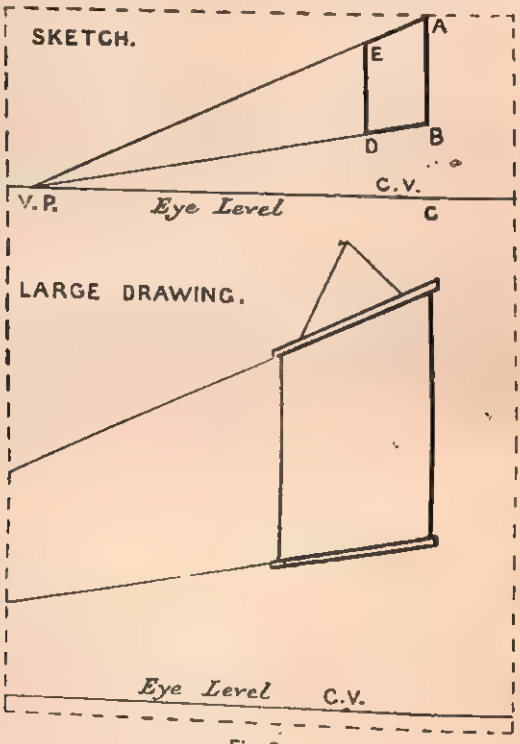


Fig. 8.

to one point. Mark a point on the glass immediately opposite to the position which the eye occupied when the tracing was made, and draw a horizontal line through this point to show the level of the eye. Call attention to the fact that the lines representing the parallel lines meet in a point on the line which shows the level of the eye. Having put the glass plane on one side, measure the average height of the pupils' eyes above the floor,

and mark that height (point C.V.) on the wall below the map. (Where pupils have seats on platforms of different height, it will be necessary to mark a point showing the level of the eye for each platform, C.V. 1, C.V. 2, C.V. 3, &c.) In the first place, the pupils should make a small sketch to show the perspective and V.P. or vanishing point. To do this direct all members of the class to draw a line, shown in the sketch with V.P. at one end and C near the other (Fig. 8), across their paper, one inch from its top, to represent the level of the eye, as in Fig. 8, where the dotted lines show the edges of the sheet of paper. Point out that the map is above the level of the eye, and direct the pupils to draw a line (A B) to represent the nearest vertical edge of the map, beginning at the top edge of the paper, and descending only so far as will make correct the proportion between the length of the map's edge, A B, and B C, which is the distance that the bottom of it is above the level of the eye. Before using the pencil in this way, ask the pupils to hold up their books or sheets of drawing paper in the position that the glass plane would occupy. When each one has this right in position, inform the class that every member could get a correct drawing, by tracing, if the sheets of paper were really sheets of glass.

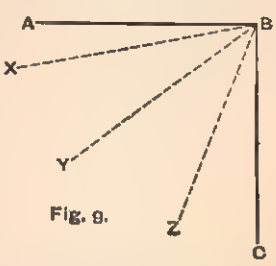


Fig. 9.

If the pupils have an old slate frame with the slate removed to hold between the eye and the object, the open space will represent to each the sheet of glass.

As each has not a glass plane, the pencil is used to find out how the lines would come on the glass plane. Just as they would be traced on it so they must be put on the drawing-paper. Direct all to hold the pencil or ruler at arm's-length, on imaginary glass planes, in a horizontal position, so that the

point (A) of the edge of the map will appear just below the pencil. The upper edge of the map (E A), though actually horizontal, will appear, when the pupils hold their pencils horizontally, to slope downwards, and must be so drawn until it meets the line first drawn to show the level of the eye in point V.P.

To get the exact slope of the line the pupils should hold their pencils horizontally and then vertically. In Fig. 9 the line A B represents the pencil held horizontally and the line B C when it is held vertically. The pupils who sit close to the wall on which the map is hung will find the top of the map appears to slope something like B Z. Those who sit furthest from the wall will find the top of the map appears to slope something like B X. Those who sit in the middle of the class will finds it slopes something like B Y. These facts the teacher should obtain by asking questions.

On the imaginary glass planes, direct the pupils to hold their pencils vertically, and to measure the apparent length of the nearer vertical edge (A B) of the map, and compare it with the further one (E D). The further edge, though actually of the same length, appears shorter, and must be drawn so, starting from the line E A, which represents the upper edge of the map. Let the direction of the lower edge (B D) of the map be compared with the upper (A E), and the latter is found to appear to have a greater slope. Show, by referring to the tracing on the glass, that these lines appear to meet on the line drawn level with the eye. Draw B D to V.P. Ascertain, by measuring, whether the apparent width of the map has been made in right proportion to the height. (The pupils who sit near the wall, with the map on it, will find the width appears very little compared with the height. Those who sit furthest from the wall will find the width appears to be very great compared with the height.) Now that a small drawing

is completed, direct the pupils to make a very much larger drawing, showing detail, on the lower part of the paper, in accordance with the discoveries recorded in the small drawing.

In the early lessons, always make a tracing on the glass,

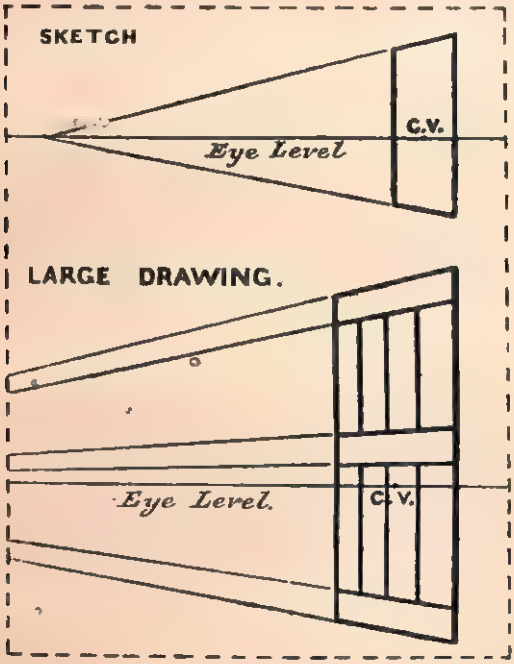


Fig. 10.

and always insist on the small drawing showing the vanishing point being first drawn on the top of the paper.

I have shown pretty fully how a first lesson should be given. In the same way, and with equal pains, three or four lessons should be given in drawing vertical planes of similar character. Experience shows that very careful lessons will produce better results than those given in a slipshod way. One result of careless teaching is that pupils get hold of false notions which

take a long time to correct, even when it *is* possible to eradicate them. It has been said to be more difficult to unlearn than to learn, and many teachers prefer an untaught pupil to one who has been badly taught.

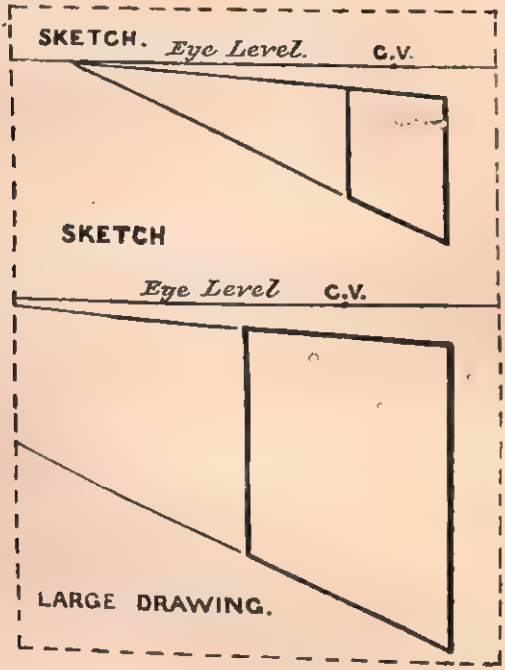


Fig. II.

The glass plane should always be used in first lessons, and every time it is employed the pupils must, if possible, see for themselves that the tracing is correct. This is of the utmost importance.

Two other illustrations are given showing a second and third lesson.

In Fig. 10 a door is represented. It may be one in a side wall below the map-sheet already drawn; or, if it be in a wall

facing the pupils, it should be placed open towards them. In Fig. 11 a black-board is shown, when it is placed on the floor against the side wall, in a position below the map-sheet.

As already mentioned in connection with the drawing of the map-sheet, a drawing to scale should be made upon a black-board before the tracing on the glass The door may be drawn to a scale of three inches to a foot, and the black-board six inches to a foot. The drawings should be made on a

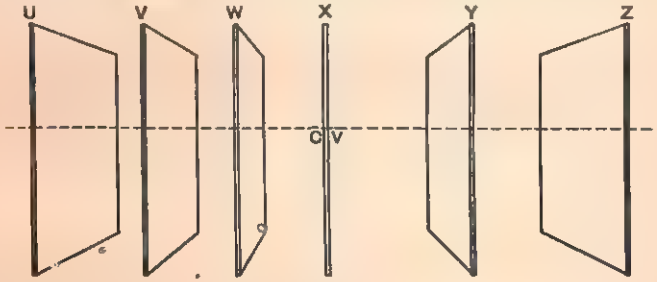


Fig. 12.

black-board used for illustrating the remarks of the teacher, and not upon that which is to be drawn as a model.

In the lessons already considered, the map-sheet gave us lines above the eye-level; the door, lines above and below the eye-level; and the black-board, lines below the eye-level.

The objects have, so far, been placed at the right-hand side of the class. Lessons from similar vertical planes placed at the left-hand side of the class should also be given.

When single vertical planes have been drawn, it is a good plan to place three or four black-boards or slates in front of the class in a vertical position, and parallel to one another, as shown in Fig. 12. Some boards would appear very narrow, as W, and some wide, as U and Z. A board might appear to some pupils to be merely a line, as at X, Fig. 14.

We now come to the drawing of that great stumbling-block.

a horizontal plane. How many fail in the Second Grade examinations because they cannot draw a black-board correctly! The examiners are said to be mainly influenced by the way in which that piece of drawing is managed.

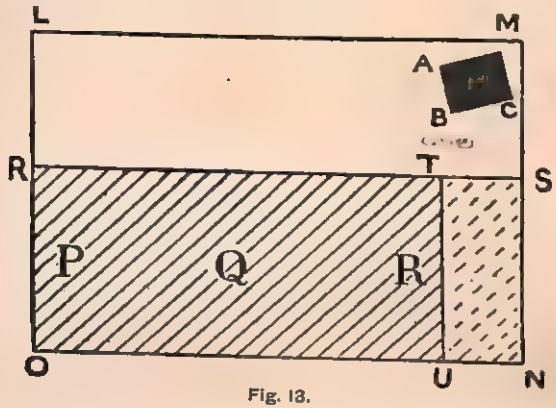


Fig. 13.

Place a black-board on the extreme right or left hand side of the class, a little below the eye-level. Its position should

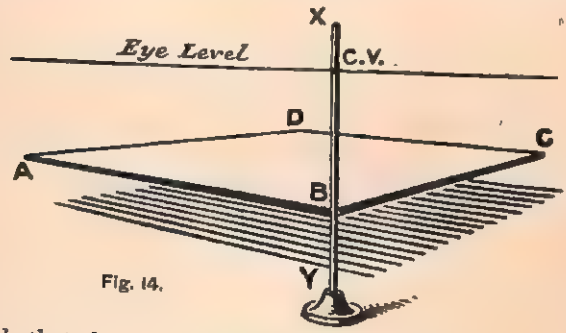


Fig. 14.

be such that the same two sides will be oblique to the picture plane of each pupil. To secure that this shall be the case, an arrangement must be made as shown in Fig. 13, where L M N O represents the plan of a class-room, R S N O the seats used by the pupils, of which those marked T S N U should be unoccupied,

in order that all the scholars may have approximately the same view of the two sides A B, B C of the black-board. A vertical rod fixed in a block of wood, such as X Y in Fig. 14, should be placed against angle B, and the actual average height of the eye of the scholars marked on it, as C.V. Where the pupils are on platforms of different heights, $C.V._1$, $C.V._2$, $C.V._3$ must be marked as before mentioned. When a tracing on the glass plane has been made and verified if possible by each scholar,

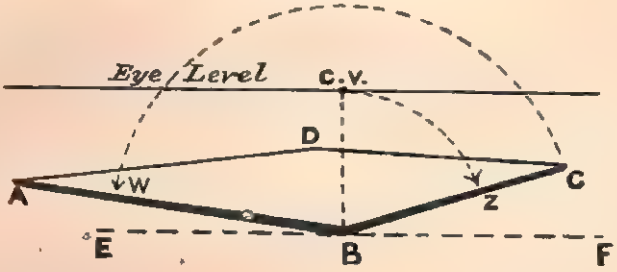


Fig. 15.

the eye-level for the sketch should be drawn near the top of each paper, and the nearest point of the black-board B indicated by a dot. This may be placed about an inch below the eye-level.

The size of the drawing will be determined by the position of point B. This distance is fixed as an inch for the sketch, so that the points in which line A B and line B C appear to meet the eye-level will come on the pupil's paper. If B be fixed far below C V on the paper, the drawing of the board will be very large, and the point where the converging lines meet will not be shown.

Those who sit near Q in Fig. 13 will find it convenient to mark B half-way between the left and the right hand side of the paper. Those who sit near P will do well to place B nearer to the right-hand side of the paper, and those who sit

near R should place B nearer the left-hand side of the paper. Request the members of the class to hold their pencils or measuring rods at arm's-length on the imaginary glass planes placed between them and the model, in a horizontal position shown by the dotted line E F in Fig. 15. The apparent size of the angle A B E should be ascertained by comparing it with the angle A B (C V), or after the manner shown in Fig. 9. Those who sit near R (in Fig. 13) will find angle C B F appears less than angle A B E. Those who sit near Q will see the two appearing equal; but A B E will appear to be less than C B F to those who sit at P.

Dot the horizontal line E F, and draw a line from B up to the eye-level, making it slope as A B appears to slope. In a similar way find the slope of B C, and draw it to the eye-level. The slope of these two lines is of the greatest importance. Nine times out of ten, pupils make the angle A B C much too acute.

Fig. 15 should be drawn by the pupils with its lines running up to the eye-level as in the sketch, Figs. 8, 10, 11, and 16.

Let the pupils measure the distance from B to (C V), Fig. 15, on the pencil or measuring rod, held vertically. The top of the pencil should be in a line with C V, and the end of the thumb opposite B. Without moving the thumb, let the pencil be revolved flat on the imaginary glass plane, so that the thumb will still be opposite B, and the end of the pencil opposite Z.

(The distance B (C V), measured from the object, will not be the same as that allowed in the sketch; if it were the same, then all the measurements made with the pencil might be marked off on the paper. That is, if each pupil made B (C V) the same as if measured from his or her position, those who sat near the model would make large drawings, and those who sat far off would make small drawings. As all are to make

the distance B (C V) one inch, the drawings will be all the same size if correctly done. Only that pupil who found B (C V) actually measured one inch on his pencil could mark off the other distances on his or her paper just the same as they measured on the pencil.)

It should be noted how much B Z is of B C. Those who sit near R (Fig. 13) will find B Z much less than B C, but those who sit near P will discover no great difference, and B Z may even be apparently greater than B C. When this comparison has been carefully made point C should be marked on the sketch.

Now let the end of the pencil be held opposite to C, and the end of the thumb placed opposite to B. Keeping the pencil flat on the imaginary glass plane, revolve it so that the end will be at W, and the thumb still opposite B. This will show how B C compares with B A. To those who sit near R (Fig. 13) B C will appear greater than A B, but to those who sit near P, the side A B will appear greater than B C. Let point A be marked.

From the tracing made by the teacher on the glass plane, the pupils have learned that A D appears to meet B C in a point on the eye-level, and that D C appears to meet A B in a similar way. There will be no difficulty in completing the drawing of the black-board.

To ascertain whether the black-board is correctly drawn, make the following test measurements. Measure the distance or diagonal from B to D, and compare it with distance or diagonal A C. Generally diagonal B D will be found too long, as pupils nearly always make the angle A B C too acute. As a second test, hold the pencil vertically at point B. Notice whether point D comes at the right-hand side of it, or on the left-hand side. See if point D has the right position in the sketch. If not, put D in the right place and alter the lines to suit it.

For a next lesson the black-board should be drawn when placed above the eye-level. In fact, it should be represented several times at different distances, above and below. The black-board may be shown horizontally above the level of the

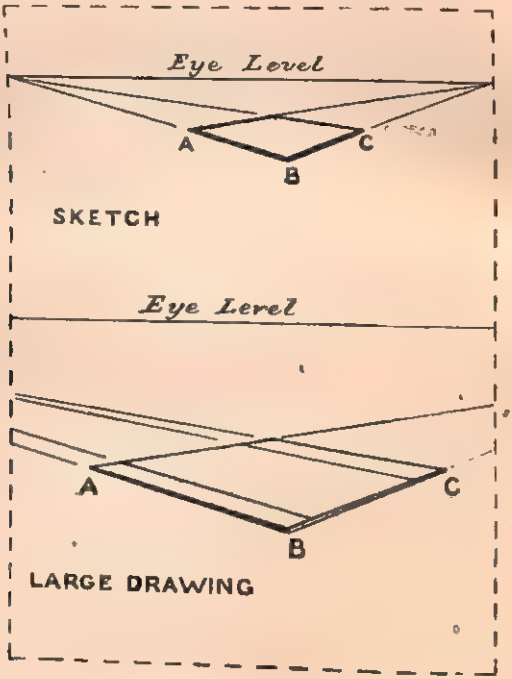
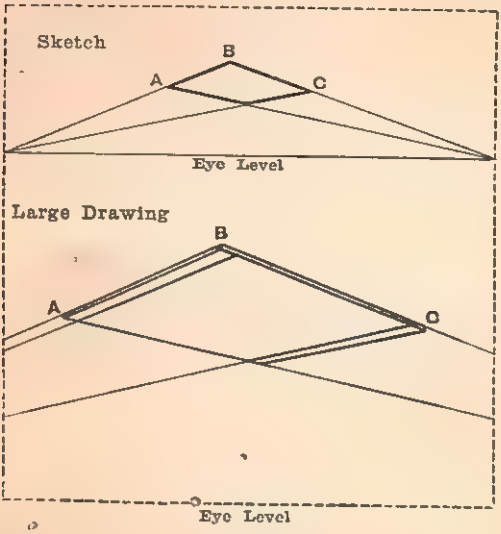


Fig. 16.

eye if it be placed on the top of two easels of the same height. Figs. 16 and 17 show two complete drawings, one below and one above the level of the eye.

If a stand is at hand, such as that made by the North of England School Furnishing Company, three drawing-boards or slates may be fixed horizontally, as is shown in Fig. 18—one above the eye, one level with the eye, and one below the eye.

Fig. 17.



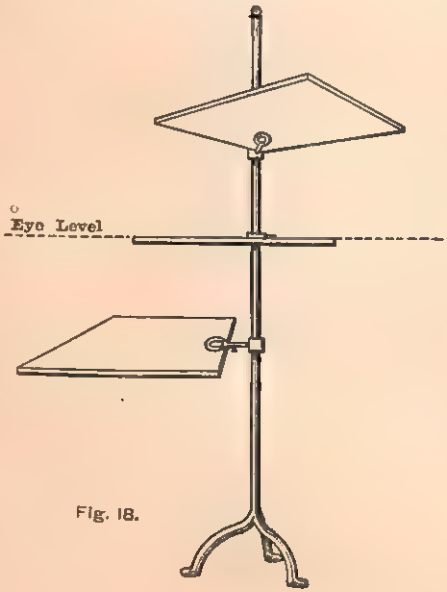


Fig. 18.

This forms a very good exercise of a character similar to Fig. 14.

The drawing of a simple cupboard will be an easy step for-

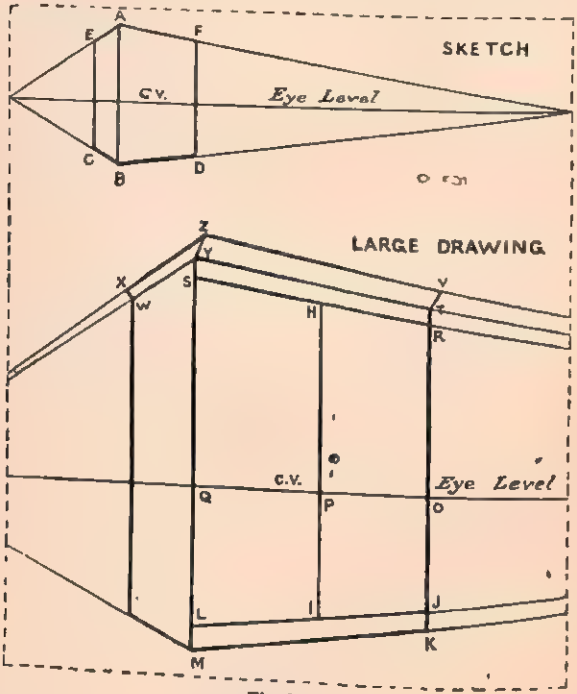


Fig. 19.

ward from the drawing of the map-sheet, door, black-board, and other simple planes.

Fig. 19 gives the sketch and large drawing of such a cupboard as may be found in most schools. It has lines above and below the level of the eye, and the vertical planes A B D F and ABCE may be dealt with just in the same way as the door, Fig. 10. In the large drawing, details have been put in which require careful attention. For knob see Book 11, Ablett's Series.

The distance S Y should be compared with T R by measuring

with the pencil, also L M with J K. The teacher should elicit from the pupils the fact that T R appears less than S Y, and that J K appears less than L M, and that the lines Y T, S R, L J, M K appear to converge to the same point on the eye-level.

The distance Q P should be compared, by measuring, with P O in order that the line H I may be accurately placed.

To obtain the position of Z accurately requires some care. The pencil should be held vertically along line S M. It should be noted whether Z appears on the right-hand or the left-hand side of the pencil, or whether it is hidden by it. Then the distance Z Y should be measured and compared with Y S by revolving the pencil. When the position of Z has been fixed, the lines Z X, Z V should be drawn. As they are actually parallel to others already drawn they appear to run to the same point on the eye-level.

The slope of X W and V T should be carefully ascertained in the same way as Z Y. Lastly, a few test measurements should be made, and a general survey taken of the "look" of the whole thing. Measurement is a great help, but, if entirely relied on, may lead to great want of proportion.

Some teachers suppose that the pencil is used to measure a distance upon a model in order to transfer it on to the paper. This is a mistake, as has been explained in connection with Fig. 15. Drawings may be made any size, as in the sketch and large drawing, Fig. 19. The measurements obtained by the pencil give the apparent size to the eye, and this is often much too small in scale to make an intelligible drawing. The pencil is to be used to make comparisons, and for nothing else in measuring.

It might prove serviceable for the pupils to change places near the end of a lesson, leaving their drawings to be looked at by their fellows. Then the teacher, by a few leading questions, should obtain each pupil's opinion as to the accuracy

of the drawing before him. Faults should be lightly marked with a cross, and corrected by the owner. A better plan is to correct the drawings of a few of the more skilful pupils and allow each to correct the drawings of pupils in the same desk.

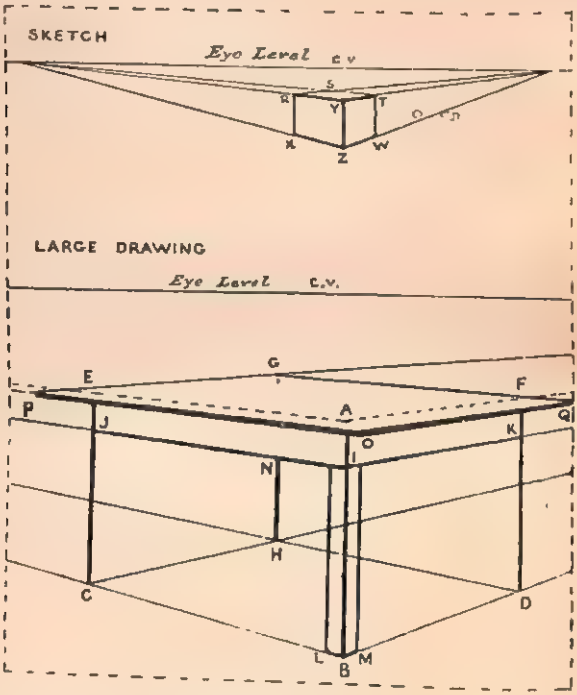


Fig. 20.

The drawing of a simple table will be a step in advance of that of a cupboard, as a horizontal plane has to be dealt with as well as vertical planes. Fig. 20 gives sketch and large drawing of a plain table.

In the sketch Z should first be fixed, and Z Y drawn in proper proportion. The planes R Y Z X, Y Z W T, R Y T S should then be obtained as shown in previous lessons.

In the large drawing, the lines I J and I K will be obtained

as S R and L J were in the drawing of the cupboard. The position of H will be obtained by the intersection of the lines from D and C.

If the lines already drawn have not been accurately placed, the length of H N will be found wrong as compared with I B.

The position of the point O, which is the projecting corner of the table, will be as difficult to fix correctly as point Z in the cupboard. With O accurately placed P and Q will be easily fixed. The legs may be represented by one line as J C. If the thickness is represented as at L and M, great care must be taken that L B and B M run in the right direction. Very often pupils do not take into account the fact that such short lines as these are parallel to longer lines, such as those forming the edge of the table, and that they appear to converge to the same point.

Legs which are made ornamental in the lathe are much too difficult to be attempted at the present stage. They should be represented by a single straight line or by two lines to indicate their thickness.

Many straight-lined objects are to be found in elementary schools which afford excellent practice, as for example, a ladder, fireplace, plain chair, swing-slate, desk, form, blackboard and easel, side of room with doors and windows, corridor or passage, and the like. In summer the playground affords excellent examples in the parallel bars, covered playground, flight of steps, &c. I have seen several good drawings made of the school-buildings themselves.

As it is customary to give cubes, prisms, and pyramids as examination tests, it will be necessary to give some special instruction in the drawing of them.

The cube and prism with a square end present no difficulty that has not been overcome in the lessons already considered.

The triangles or polygons which figure in some pyramids and prisms are the most difficult drawing in those models.

The way in which they may be dealt with is given below.

Draw an equilateral triangle, as big as you can get it, on a black-board, or better still on the back of a map-sheet. (Let it

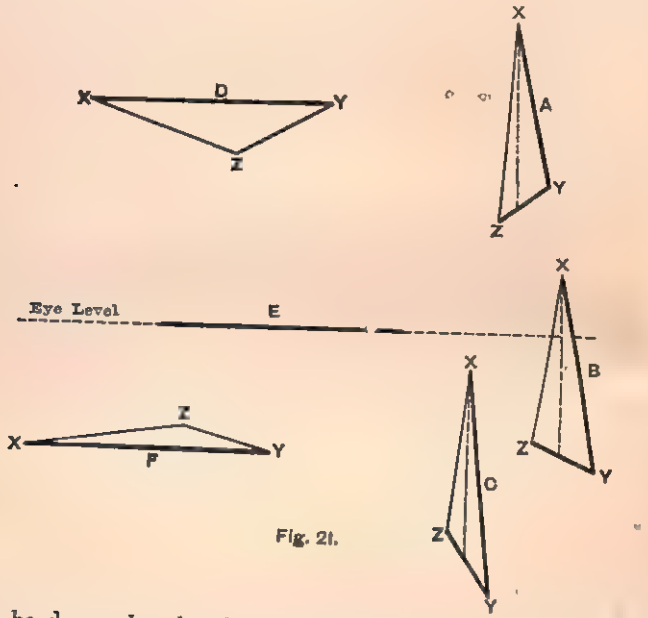


Fig. 21.

first be drawn by the class as a freehand copy when placed directly in front of the class, on a small scale.) Then it may be placed vertically above the eye-level or with its centre on the eye-level, or below the eye-level as represented in Fig. 21, as A, B, C, respectively, or it may be placed horizontally above the eye-level as at D, or on the eye-level as at E, or below the eye-level as at F.

The direction of X Y should be obtained by using the pencil as described in connection with Fig. 9, and its length fixed. The length may be that which best suits the convenience of

the drawer: 3 inches would be a good size for a class. The direction of Z Y should be obtained in the same way as used to find X Y. By revolving the pencil as in Fig. 15, compare

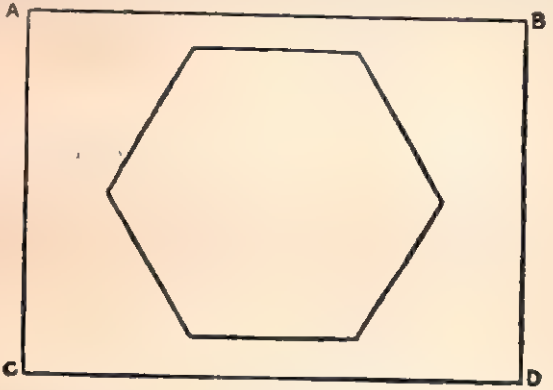


Fig. 22.

the apparent length of Z Y with the apparent length of X Y, and make Z Y the right apparent proportion to the line X Y. Join X Z. Make the pupils note that the vertical line from X does not bisect Z Y.

In Fig. 22, A B C D represent a black-board with a hexagon

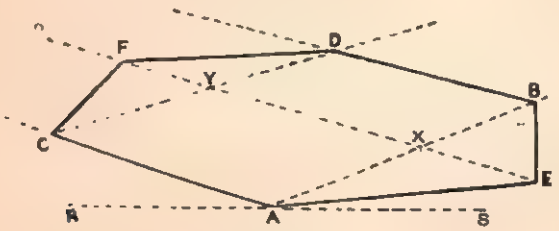


Fig. 23.

three feet in diameter drawn in chalk upon it. The real shape of the hexagon should be copied by the pupils when the black-board is in its usual position upon the easel. When this has been done, the black-board should be placed horizontally, and

the hexagon drawn as it appears in the new position, that is, something after the fashion shown in Fig. 23.

In arranging the position of the black-board take care that a line from A to D points towards the centre of the class.

Point A should first be fixed, and the line A B then drawn with great care as it is very important. The pencil held horizontally, that is as R S, will show the angle R A C. Draw A C. Then B D being actually parallel to A C will appear to converge to the same point on the eye-level. F E should also be drawn to that point, for it is really parallel to A C and B D, and is really half-way between them. A X will appear a little longer than X B, for it is a little nearer to the eye. Point C should be fixed after measuring A B on the pencil and comparing its apparent length with that of A C by revolving the pencil. Draw line C D. C D and A B are really parallel, but appear to converge to the same point on the eye-level. Ascertain the direction of B E by holding the pencil vertically and horizontally as in Fig. 9. Mark E. Make distance from Y to F rather less than X E. Draw the lines B E, E A, F C, F D. As a test of accurate drawing, measure distance A D, and compare it with distance C B. Also hold the pencil vertically from A, and notice where D comes in relation to it.

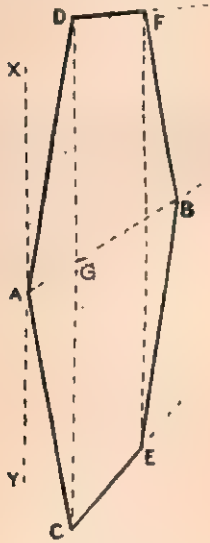


Fig. 24.

Fig. 24 represents a drawing of a hexagon when the black-board is placed on an easel against a side wall so that point A is much nearer to the pupils than point B. First draw D C. Ascertain the direction of C E carefully, as in Fig. 9. D F, A B

appear to converge to the same point on the eye-level as C E. After drawing D F obtain the middle point G and draw A B of indefinite length. Fix point A. Hold the pencil in the position X Y, that is, vertically, and note the angles X A D, Y A C. Mark point B, and to see if points A and B are rightly placed measure the distance A B and compare it with C D.

CHAPTER V.

DRAWING CURVES AS SEEN FORESHORTENED.

In dealing with the model drawing of curves the drawing of the circle may be taken first. The circle seen obliquely always appears to be a true ellipse. Some teachers of drawing contend that this is not the case, because the diameter of the circle appears to be less in length than a certain chord in it, but their opinion is directly opposed to well-known principles of mathematics. Fig. 25 shows a side elevation of the position of the

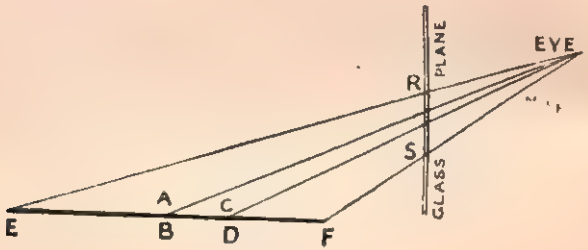


Fig. 25.

eye, the glass plane (picture plane), a circle, and the rays of light passing from the points E A B C D F in the circle to the eye and through the glass plane.

In Fig. 26, a plan of the lines shown in Fig. 25 is given. From the latter it will be seen that the rays passing from the ends of the diameter A B have the distance *a b* between them on the glass plane, whilst the rays passing from C D have a greater distance *c d* between them. The diameter of the circle A B therefore appears to the eye less than the chord drawn between the tangents which pass through the points C D. The line C D is the major axis of the ellipse which represents the circle, and C F D is represented by one-half of the ellipse, and C E D by the

other half of the ellipse. The rays of light passing from all points of the circle to the eye form an oblique cone. Its side elevation is shown in Fig. 25. The glass plane cuts a section through this cone in the line R S. Mathematicians tell us that any section of such a cone which is not cut parallel to its axis or its side is an ellipse. The section is shown by the tracing on the glass plane, which accurately represents the circle.

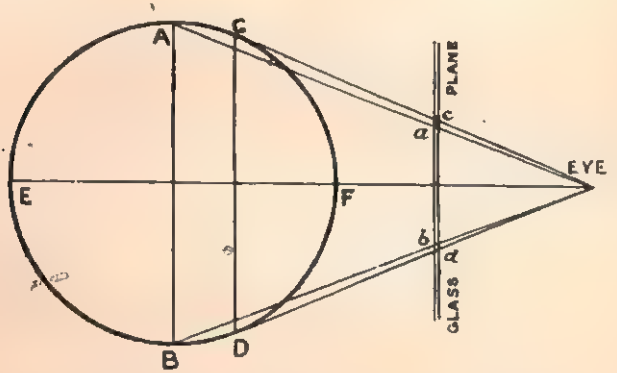


Fig. 26.

In teaching a class to draw a circle as it appears, it is desirable to work from a big one. If there is a square black-board in the school describe a circle on it as large as it will hold. If the black-boards are all oblong, draw a line so as to divide the board into a square and a long narrow oblong. Describe a circle in the square with a thick line.

The pupils have already had practice in drawing the black-board. When they have made an accurate representation of it let them draw the circle in it. Tell them the circle must be represented by a true ellipse, and point out that it will pass through the points A B C D (Fig. 27), but that its major axis will not pass through X, but be on the nearer side of it. It is very important to explain that the position of the major axis R S

will be at right angles to the line which passes from each pupil's eye to point X. The position of R S may be found out by holding the pencil on the imaginary glass plane supposed to be placed between the eye and the object.

Fig. 27.

In Fig. 28 the dotted line represents the eye-level. A and B represent discs placed vertically and horizontally directly

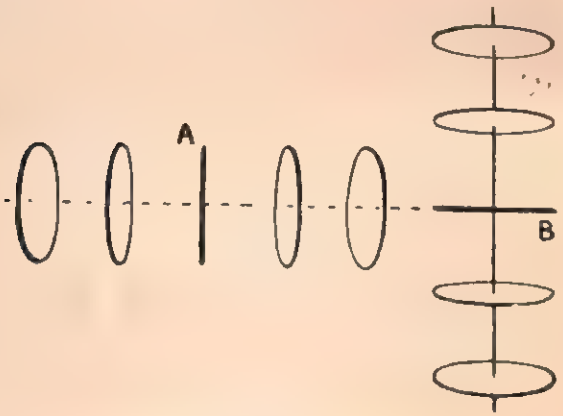


Fig. 28.

opposite the eye. They appear to be lines. Discs above and below the eye-level and in a horizontal position are shown joined together with disc B by a rod. A useful model may be made by fastening in a similar way a number of discs of cardboard one above another on a stick which has a square section. The model may be placed either as at B or as at A. In either

position good practice can be obtained. It is want of such practice that leads to the mistakes made in drawing the two

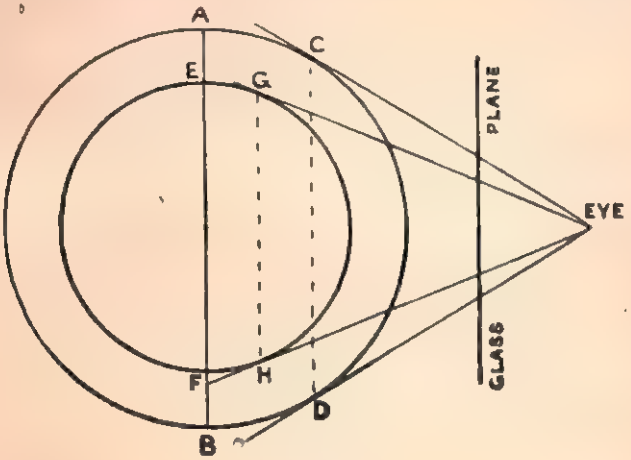


Fig. 29.

ends of the cylinder, the mouth and base of a vase, the hoops of a barrel, &c.

Fig. 29 is a plan showing two concentric circles. It will be

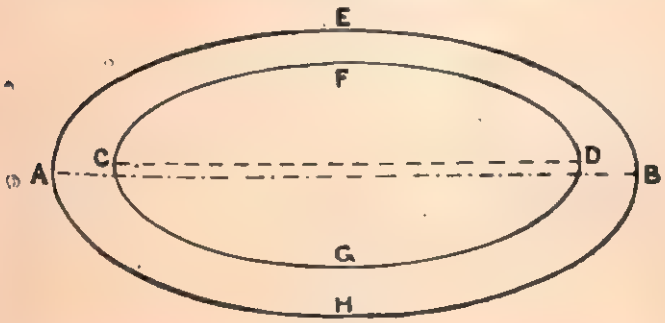


Fig. 30.

noticed that the chord C D, which forms the major axis of the ellipse that will represent the larger circle, occupies a different

position to the chord G H, which forms the major axis of the ellipse that will represent the smaller circle. Fig. 30 gives the perspective or model drawing of two concentric circles. The major axis of the smaller ellipse appears nearer the true centre of the circle than the major axis of the larger ellipse, as in Fig. 29. Notice that the distances A C and D B are equal to one another, and greater than G H. Also notice that G H is greater than E F. The mouth of the broad red vase which is supplied to schools as a model, is often wrongly drawn, because attention is not called to these differences between the real and apparent form of concentric circles. If an inner circle, concentric with the discs already shown in Fig. 28, be drawn on them, good practice can be obtained in working out this principle, shown in Figs. 29 and 30 but at varying heights in relation to the eye. It would be better still to draw large circles on a blackboard, and to place the board at a different height in relation to the eye each time the circles are drawn. The circles may be seen above the level of the eye if the board is inverted and

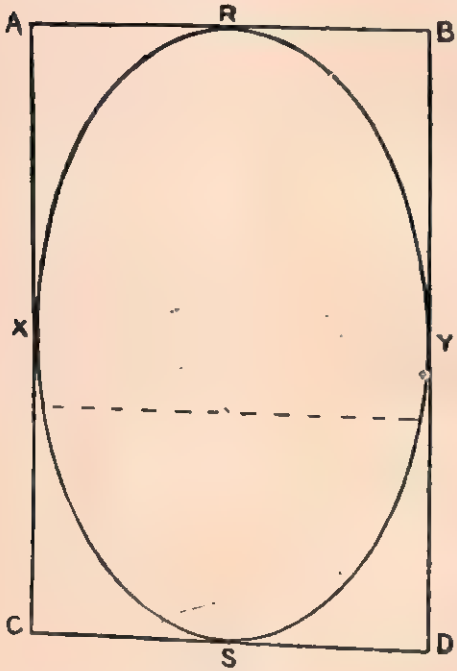


Fig. 31.

placed on the top of two easels, put sufficiently near together for the purpose.

Fig. 31 shows an ellipse drawn to fill a black-board. The outline of the board and the ellipse should first of all be drawn as a free-hand copy. Then a drawing of the black-board and ellipse should be made when the black-board is placed horizontally not much below the level of the eye. They will appear something like Fig. 32 if RS runs towards the spectator's eye. Notice that the axis XY, which is really the shorter, appears as the longer. As in the case of the circle in Fig. 26, where the axis of the ellipse did not represent the diameter of the circle, so the line XY of Fig. 32 does not represent the axis XY of Fig. 31, but a chord somewhere about the position of the dotted line in Fig. 31. When this view has been satisfactorily drawn, the black-board should be arranged as in Fig. 33, so that the distance XY will appear the same as RS; that

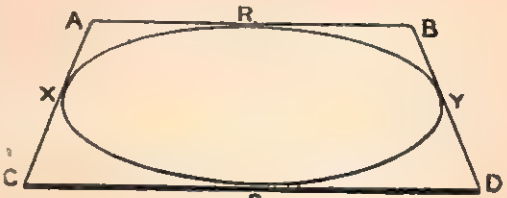


Fig. 32.

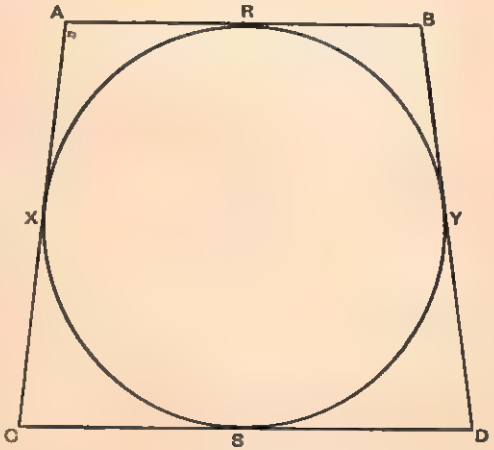


Fig. 33.

means that the ellipse will appear as a circle. Note that lines C A and D B are not nearly horizontal and consequently appear to vanish in a point above the eye-level. The drawing of the elliptical mouth of a coal-scuttle will be made comparatively easy through this exercise. Such exercises should not be attempted until pupils can draw the black-board well, and the black-board should always be first drawn.

It is not necessary that the detailed explanations given here should be given to the pupils. They are intended for teachers more than pupils. A considerable amount of discussion has, at one time and another, been caused by these matters, and it is necessary for the teacher to know exactly the facts of the case.

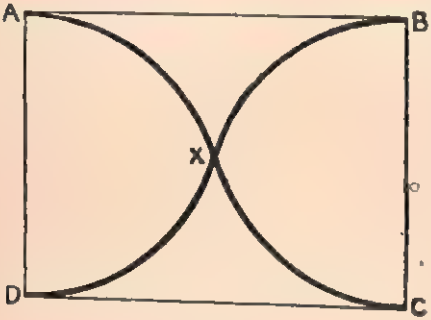


Fig. 34.

The drawing of the circle and ellipse has been first considered, as they are the easiest curves.

Fig. 34 goes a step further, in that it shows curves which turn in two directions, instead of being continuous.

Fig. 34 shows curves drawn to fill a black-board. The outline of the board and the curves should first be drawn as a freehand copy, in order that the pupils may fully appreciate the fact that the four curves A X, B X, D X and C X are precisely alike. This drawing need not be larger than 2 by $1\frac{1}{2}$ inches. When the freehand drawing has been made, the black-board should be placed below the level of the eye, as shown in Fig. 35, and the board should be drawn as described in Fig. 15. When this has been satisfactorily done, the point X, where the diagonals intersect, should be marked.

Pupils should be directed to hold their pencils on the imaginary glass plane interposed between them and the board

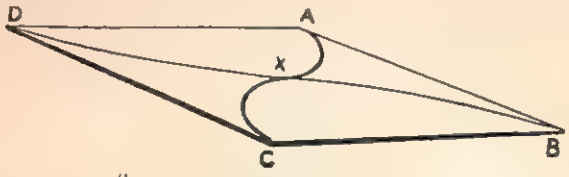


Fig. 35.

(so that X and C will appear close to one edge of the pencil), and to notice the apparent curvature of the curve from X to C. In the same way they should hold the pencil between X and B, and notice the apparent curvature of that curve. The difference between the two will appear something like that shown in Fig. 35, if the black-board is placed, and this is of great importance, with the diagonal A C running towards the centre of the class. Another important matter, in the arrangement of the relative position of the class and the model, is that the class should form a compact body of such a kind that the pupils have nearly the same view of the object. This can be brought about by placing the model some distance to the extreme right or left hand side, in front of the class.

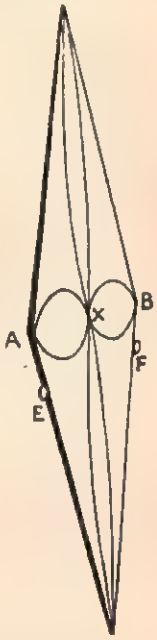


Fig. 36.

When the pupils have drawn curves C X and X B, they should find out the apparent curvature of D X and A X, by using the pencil as described above. When the whole of the curves have been well drawn, the difference between those from D to X and X to B, compared with those from C to X and X to A, should be pointed out. The fact that

the whole of the curves in Fig. 35 are unlike those in Fig. 34 should also be brought to the attention of the pupils. The drawing of curves as they appear forms *the great difficulty* that draughtsmen have to overcome in learning their profession. I have invented this method of teaching to lessen that diffi-

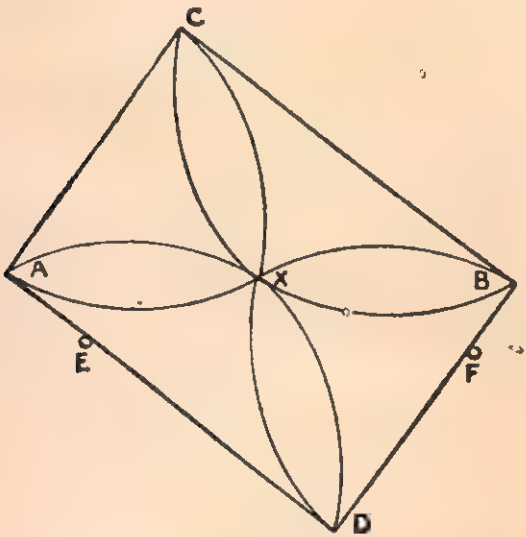


Fig. 37.

culty, and I know of no plan so likely to secure that result in elementary work.

It is not always possible to place a black-board satisfactorily in the position indicated in Fig. 35.

Another position is shown in Fig. 36, where the black-board is placed on an easel against a side wall in front of the class. The black-board should be drawn as a freehand copy when placed in front of the class, as in Fig. 37. The pegs of the easel are shown at E and F, so that one diagonal of the board is placed horizontally. When the board and easel are placed

against the side wall, so that board and curves appear as in Fig. 36, to give practice in model drawing, the pupils should be brought into a compact body as near that side wall as possible; for those who sit at the other end of a long room, and especially those in the front desk, will have an almost front view of the board, and will see it as shown in Fig. 37.

Fig. 38 will explain this. When the black-board and easel

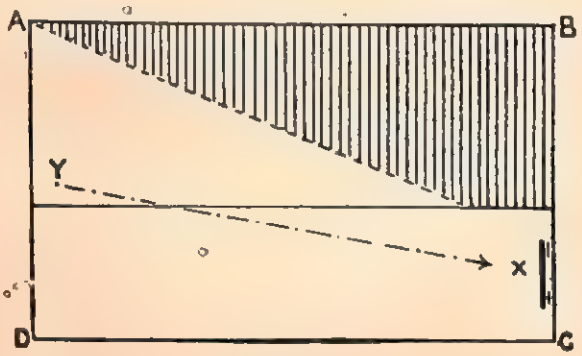


Fig. 38.

are placed as at X, in plan of the class-room A B C D, the pupils should sit only in that part of the room which is shaded, otherwise the teacher will be unable to give an effective demonstration to all. Any pupil sitting at Y, for instance, would practically have a front view of the black-board. The difficulties already mentioned, of placing the board as in Fig. 35, may be overcome as shown in Fig. 39. A black-board is placed in each of the corners, D and C, of the class-room A B C D. The pupils who sit in that half of the room marked X, should draw from the board at C, and those who sit at Y from the board at D. Both boards may have on them the same curves, or one may have a set of curves of greater difficulty than the other, to suit the capacity of the better drawers.

Instead of the black-board being placed in the positions

indicated in Fig. 35 and Fig. 36, it may be placed as in Fig. 41, that is, horizontally, but above the level of the eye. This can

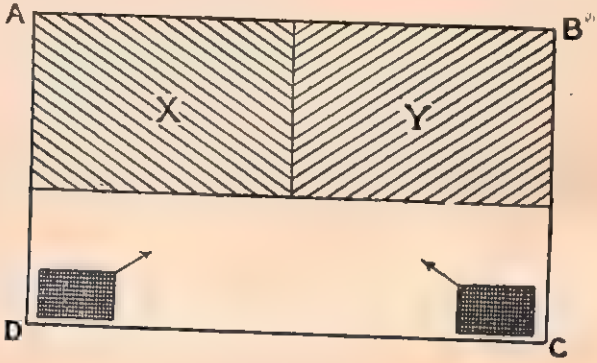


Fig. 39.

be managed by placing two easels of the same height side by

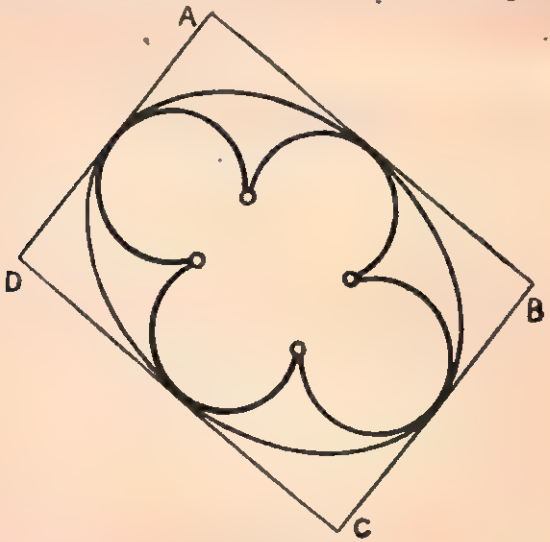


Fig. 40.

side, and placing the black-board horizontally on the top of them. The curves would in this case be on the under side of the black

board, as shown in Fig. 41. Notice that the parts of circles appear to be portions of ellipses with the major axis horizontal. For this purpose they must be drawn very distinctly in black on a sheet of paper as large as the black-board. The drawing of these curves is by no means an easy exercise, though it is considerably easier than the drawing of the handle of a flat-iron or of a dust-pan, both of which objects have been given in the First Grade examinations.

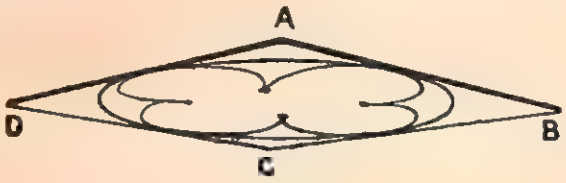


Fig. 41.

The advantage of drawing large curves, such as fill a black-board, is that the pencil can be effectively used when held between the eye and the object. It is impossible to gain any help from the pencil, if the object is small, like a flat-iron, or cup and saucer, and placed at a considerable distance from the child who is drawing.

Here I have dealt with that part of the subject which can be the most successfully taught in an ordinary class-room. Teachers make a great mistake who give instruction only in the kind of work that will be given in the examination. It is far easier to teach the principles from large objects than from small ones. Pupils who have learned their model drawing merely from cubes, cones, prisms, and cylinders, entirely fail to grasp the mere rudiments of the subject. This I have ascertained by practical tests over and over again.

CHAPTER VI.

FREEHAND.

We now come to consider Freehand Drawing. The term *freehand* has become restricted to what is really only a very small part of drawing with the unaided hand—to the drawing of outlines of decorative forms with pencil. In the Second Grade examination, freehand is narrowed down still further to the drawing of balanced or bi-symmetrical ornament. There is beauty in a bi-symmetrical arrangement, for it is that of the human figure, the most beautiful of all forms. But the human figure, though bi-symmetrical, exhibits considerable diversity in its details. Both hands, both eyes, both ears are seldom exactly alike, and never, I may venture to say, in a good figure by the sculptors of ancient Rome and Greece. To have both sides exactly alike appears to detract from perfect form.

However beautiful a perfectly bi-symmetrical arrangement is in its best exemplification, it is not the sum and substance of beauty; and there is surely no advantage in confining all the attention of pupils to this one feature of decorative art, through all the weary course (from infancy to adolescence) necessary to give sufficient skill to pass the Second Grade examination. As the balancing, or getting two sides alike, may easily be done with the aid of a piece of tracing paper, it is scarcely necessary to spend so much time in acquiring such skill with the free hand.

If this dreary course of copying lines (which is scarcely more interesting than writing a copy in a copy-book) gave a child any real power in drawing, we might overlook the fact that, contrary to sound principles of education, the pupil is set to copy conventional arrangements of plants before it has

drawn the true shape of the plant itself. An experienced educationalist wrote to me some time ago, saying, "the continual practice of freehand is decidedly cramping to the pupils, and gives them a distaste for drawing." In my own experience, I have never found that any great proficiency in freehand necessarily foreshadowed talent in drawing from objects or materially helped it. Indeed, those who willingly submit to a long course of freehand have few artistic capabilities, beyond a power of patient plodding on without a goal in view.

It may be said, that if freehand does not teach much of drawing, it cultivates a liking for design. The weight of evidence is against this view, and if it were not, the teaching of design is a matter of slight importance in elementary schools. We cannot hope, were it desirable, to make all children designers, but we can train their faculties, and give them such skill in drawing as will be almost as useful in after life as are reading and writing.

Drawing is a means of rousing and developing certain faculties and perceptions, that would (without its practice) lie dormant. It affords a means of training the mind to attention and accuracy, which is of immense importance.

Are these great gains to be won by an unintellectual and dreary exercise such as freehand, which disheartens those who should be encouraged, when it is practised from forms meaningless to the pupil?

In Books 3, 7, 10, 13, 16, Ablett's Series, all the copies are varied as much as possible, and colour is introduced to make the work more attractive. Colouring is also useful in calling attention to the masses or areas of the various parts. The habit of comparing masses and spaces cannot be acquired too early in learning to draw.

Outline drawing from *flat examples* may be made both an interesting and intellectual exercise if managed in the follow-

ing way, from objects which are real, known, and understood by the children.

Hang a calico kite upon the black-board by fastening it with a drawing pin. In Fig. 42, A B C D represents a black-board. X the real kite. This is placed on the right-hand side, so that

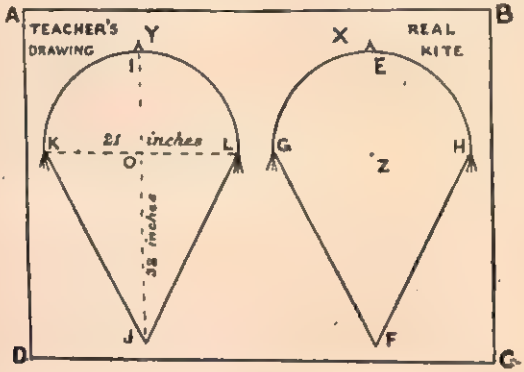


Fig. 42.

the teacher will not stand in front of the object when making the sketch Y, which is to show the pupils how to set to work.

The teacher measures with a ruler the distance E F and rules a line I J equal to it, that is, 32 inches long. The pupils are asked to rule a line the same length on their paper. They find they cannot. The teacher tells them to let a quarter of an inch in their drawing represent an inch of the kite. They rule a line as long as 32 quarter-inches, that is, 8 inches long, to represent E F. The teacher measures the distance E Z, which is 11 inches, and marks point O. The pupils measure off 11 quarter-inches to get point Z. The teacher measures G H, which is 21 inches, and marks $10\frac{1}{2}$ inches on one side of O to get K, and $10\frac{1}{2}$ on the other side of O to obtain point L. The pupils do the same, using a quarter of an inch for an inch. Nothing need be said about drawing to scale, although practice in it is thus given. The rulers are put on one side, and the

pupils are asked to observe the curve G E H, without drawing it. The curve is then covered up with a duster or sheet of brown paper. When this is done, each pupil sketches the curve from memory in a corner of the paper. One or two trials, managed in the same way, will be necessary before the majority of the class will draw the curve well. This exercise trains the mind, through the eye, to be accurate in observing. When the pupils know the curve, they should be required to sketch it, beginning at G, passing through E and ending at H. The teacher, by sketching a line from K, through I to L, will show them the method of manipulation. It is well for the pupils to get the hand into a good position before drawing by sketching an imaginary line in the air, just over that portion of the paper where the real line is to be placed. The line from H to F should be drawn first by the teacher and then by the pupils. In the same way G F will be drawn. When the pupil has made a clean and careful sketch, do not allow it to be ruined by lining-in, which, in the vast majority of cases, means the spoiling of a fairly good drawing by the dragging over it of a hard, shaky, inartistic line. Skilful artisans or designers may find lining-in useful. It is little practised by artists, and is of no use to children, especially as it is not possible for them to do it even fairly well.

A great number of flat objects are suitable for copies from which to give practice of this kind—Japanese fans, painters' palettes, meat-hooks, hatchets, pair of tongs, scissors, large feathers (swan's quill), cricket-bat, wooden spoon, tennis racket, lacrosse racket, &c.

These objects should be placed at such a distance from the pupils, and in such a way, that the thickness, if there be any, will not be seen by them, and the objects must not be seen foreshortened.

By making groups of the objects, two or more together,

exercises of considerable difficulty may be obtained. Below are some examples:—

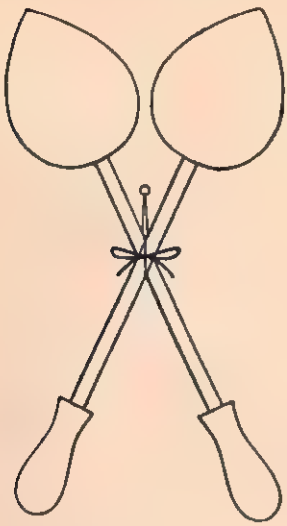


Fig. 43.

Fig. 43 shows two wooden spoons fastened together, and hung from a drawing-pin stuck in the blackboard.

Fig. 44 shows a group of three palm-leaf fans, pinned on a blackboard to make a bi-symmetrical arrangement.

In Fig. 45 three painters' palettes are arranged in a group. To draw this group accurately requires considerable skill, and it is a much more difficult test than an ordinary balanced copy.

By this kind of drawing the pupil learns enough of drawing to scale to enable it to understand the maps in the geography lessons.

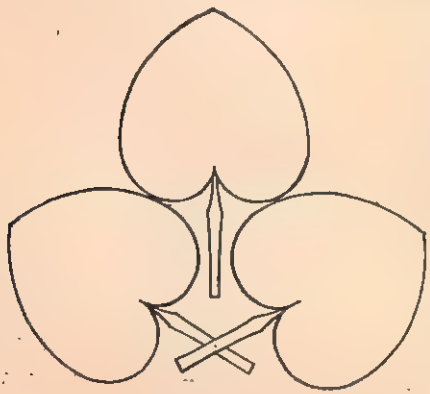


Fig. 44.

By drawing curves hidden from view the graphic memory is improved, and accurate observation becomes an absolute necessity. The pupils are obliged to look well and intelligently, in order that the memory may retain that which is seen in the form of *stored-up observation*. People who think "they can believe

their eyes" would be less firm in their belief if they had a little of this practice. Drawing from memory should be constantly resorted to, for the memory is brought into play in

Fig. 45.

every act of drawing, and defective memory is the result of bad observation.

The acuteness of the perceptions may be increased if the eye be trained to judge at sight, length, proportion, length compared with breadth, and angles. This training can be easily given to a large class by means of the Sight Trainer. Its use is explained in Book 5, Ablett's Series.

The outline drawing, which we term writing, may be made to work in advantageously with other drawing if the ordinary copy-book exercise be alternated with exercises in "Written Design." Examples of this work may be found in a little book bearing that title, and published by Messrs. Chapman and Hall.

CHAPTER VII.

SHADING.

Shading is a most important branch of art education, which does not always obtain that share of attention which it imperatively demands (Book 17, Ablett's Series). All should pass through a course of class teaching in this subject, because it is a useful test of the amount of talent that each possesses, and because its principles can be demonstrated to all and be useful to all, even to those who lack a delicate perception of its more subtle graduations. The machine draughtsman, architectural draughtsman, engraver, wood-cutter, and many other art-workers, find a knowledge of the principles of light and shade very useful, and it is also very necessary to those who wish to make effective outline sketches.

Among skilled teachers the stump is now generally accepted as the best instrument with which to teach the elementary principles. While recognizing the value of the point in the hands of a skilled draughtsman, we should adopt the stump, as it will enable our pupils to learn more quickly. Some preliminary practice in manipulation may be given in shading some of the spaces of an easy design, but we must teach the principles of shading from models and not from copies. The latter practice is as wasteful of time as to teach model drawing from printed examples, putting theory before facts. For class teaching the pupils must be arranged so that they may have approximately the same view of one object, well and strongly lighted. The teacher, having previously made a small sketch of it in light and shade, from a position near the centre of the class, will demonstrate, working on a large sheet of paper, the methods of procedure and the principles, being followed, step by step, by the pupils. Great pains must be taken to ensure a good

method of manipulation. A large gray paper stump, as big as the thumb, and the stumping chalk known as Sauce Velours, should be used on the white paper named *Papier Ingres*. They can be obtained of Messrs. Lerchertier, Barbe, & Co., 60 Regent Street, at a moderate cost. The stump should be pressed very lightly upon the paper in order that the grain of the latter may not be rubbed down. In good shading the chalk remains gray or black, but if it is rubbed or scrubbed into the paper, to the destruction of the grain, it turns brown. If the chalk is properly applied, a piece of bread, worked between the fingers into a flattened ball, will easily wipe out white lines on the shaded surfaces. The bread is of great use in the latter stages of a drawing, when employed in this way; but it should not be used at all until the drawing is nearly complete. Bad habits in manipulation may be easily acquired, and it is more difficult to eradicate wrong methods than it is to implant those that are right. Suitable models, arranged in the order of their difficulty, must be chosen to illustrate the effect of contrast and reflections, and groups of models to show the changes brought about by aërial perspective. When models, such as the cube, cylinder, and cone, have been dealt with, and practice in shading detail becomes necessary, large casts, such as the pumpkin, vegetable marrow, and ostriches' eggs, afford good practice. The light should come from only one window, which should be blocked at the bottom, so that the rays will fall on the object at about an angle of 45°. The nearer the object is to the window the stronger the shadows will be, and the easier the shading.

The following rules will be found useful in regulating the execution of a shaded drawing:—

1. Lay in the masses of shadow, being very careful to draw them well, dealing with the darkest first, the lightest next, and those of intermediate depth afterwards.

2. Lay in the background of rather less than the right depth.

3. Mark out the position of the highest light, and put in, of right depth, the deepest shadow.

4. Obtain the graduations between the highest lights and the masses of the shadow.

5. Put in the darker parts of the shadows.

6. Graduate the background.

7. Look carefully through the whole drawing, and work up the proper relations among the parts.

By this method, the extreme points of the scheme of light and shade are fixed as early as possible, and the depths are judged from them, and it will be impossible for a careful student to exhaust the deepest shade the chalk will give before putting in the darkest part of the drawing.

The teaching of shading is not at all difficult. I have known many students of moderate ability learn to make a fair shaded drawing from the cast after a course of class lessons which took up altogether about forty hours.

CHAPTER VIII.

PRACTICAL HINTS ON THE MANAGEMENT OF THE EXAMINATION.

The Inspectors.—As a rule, these are retired officers of the army, and smartness, in the military sense of the word, is much appreciated by them. All the arrangements for the examination should be well thought out and carefully prepared, and the scholars should be encouraged to come to school as clean and tidy as soldiers for a parade.

It is generally necessary to send to the Inspector, beforehand, a sketch plan of the class-rooms to be used. Should he desire, on the day of the examination, other arrangements than those prepared by the head teacher, it is well to have assistance at hand to carry desks from room to room, since nothing is so likely to upset the pupils as excitement and flurry just before the examination begins.

Drawing Materials.—A sufficient quantity of well-sharpened pencils, rulers, set-squares, and india-rubber ought to be provided for each Drawing Standard. Cartridge paper should be provided of the regulation size. This must be $11 \times 7\frac{1}{4}$ inches for all work except shading and drawing from the cast. For the latter the paper should be $11 \times 14\frac{1}{2}$ inches, and Whatman's not pressed medium is the most suitable. Better results are likely to be obtained, because the examiners can readily identify the papers, if a heading is printed on each of the papers used in the examination. This heading may be as follows:

School..... .....

Drawing Standard .. *No. of Card* .

Name of Candidate..... ..... *Age*..... ...

Paper $11 \times 7\frac{1}{4}$ inches, and ruled in squares of $\frac{1}{8}$ inch side, should be obtained and be in readiness to supply about half the candidates in Drawing Standard IV., as it may be needed for drawing to scale. It is advisable to obtain a quantity of the above-mentioned examination papers some time before the examination, so that the candidates may become accustomed to their use by doing some drawings upon them. The desks are often uneven on the surface, and it is well to provide each pupil with a Blank Exercise or Copy-book on which to place the drawing-paper.

Very cheap rulers are sure to be inaccurate. It is necessary to pay a sufficient price to ensure perfect accuracy, for it is most injurious to allow young people to use rulers on which the inch appears as a variable quantity.

Managers.—It is desirable for one or more managers to be present on the examination day. The schedule should be made out so as to give a minimum amount of trouble to them and the Inspector.

Specimen Lessons.—The test drawing copy for Drawing Standards I. and II. is usually given by means of a lesson delivered by a member of the staff of the school, who is chosen for the purpose by the head teacher. Similar lessons may be asked for in any other Drawing Standard, but are rarely, if ever, required.

The time allowed is from twenty minutes to half an hour, and in that time the same figure has to be drawn twice and on the same side of the slate or paper, once with the ruler and once freehand. Some inspectors desire only one figure to be drawn, and require half the class to use the ruler and the other half to draw without using the ruler, that is, freehand.

Some teachers spend ten minutes in preliminary talk and questioning, and so shorten the time which the children have

for actual drawing, and thus lessen their chance of doing accurate work. The best plan appears to be this: Directly the teacher is told what figure has to be represented he or she should draw it quickly and accurately on the black-board, large, and with a teacher's ruler, whilst the scholars watch the method. Very often the copy is one of those which is printed on the inside of the back part of the cover of Books I. and II. of Ablett's Series. As soon as the teacher's drawing is complete, the pupils should begin to draw, following the teacher step by step as he or she points to each part as slowly as the class works. Explanations may be given and questions asked as the work proceeds. The more the lesson takes the form of a drill the higher it is likely to be valued. When the scholars have finished the copy with the ruler (set-squares may also be used if not specially forbidden), they will be more likely to make a good drawing without the ruler than if they drew the freehand in the first place.

A large but light T-square with inches accurately marked on it is of great use to the teacher.

The children are usually required, in the first place, to rule a line across the slate or paper so as to divide the space for the ruler drawing, from that for the freehand drawing. Practice in doing this is necessary, as a line drawn askew not only looks untidy but is very likely also to interfere with the correct drawing of the figures.

Short-sighted children should be placed in the front desk, or they will be unable to see the copy, and, in consequence, produce bad drawings.

Care should be taken that every one in Drawing Standard I. is provided with a smooth slate, not cracked or ruled. The Inspectors require careful and fairly accurate drawings from these two Standards.

Some of the more difficult examination tests which have

been set to Drawing Standards I. and II. are the following, shown in continuous or solid lines:—

These will be found easier if inclosed in a square or rectangle having one side horizontal, such as shown by the dotted lines.

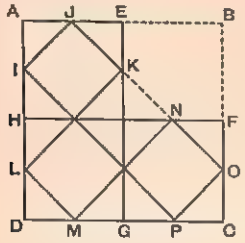


Fig. 46.

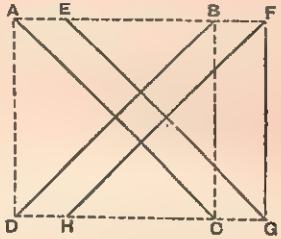


Fig. 47.

In Fig. 46, draw the square A B C D; bisect its sides and draw H F, E G; mark points I, J, K, L, M, N, O, P; draw lines

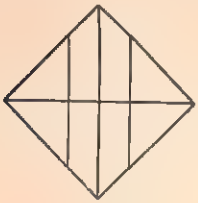


Fig. 48.

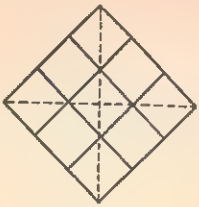


Fig. 49.

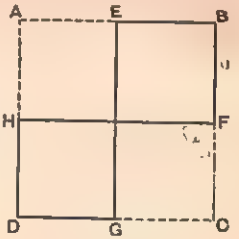


Fig. 50.

I P, J O, L M and afterwards L K, M N, I J, P O; rub out the dotted lines.

In Fig. 47, draw the square A B C D; rule its diagonals; mark off A E, B F, D H, C G; complete the rectangle A F G D; rule lines E G, F H; rub out the dotted lines.

In Fig. 48, draw the diagonals first, join their ends to form the square, and, lastly, rule the two lines parallel to one of the diagonals.

In Fig. 49, draw the dotted diagonals; join the end points of these to form the square; divide each side of the square

into three equal parts, and rule the remaining lines; rub out the dotted diagonals.

Fig. 50 is found to be troublesome. The square A B C D should be first drawn, and the sides bisected in points E, F, G, H; join E G, F H; rub out the dotted portions.

Fig. 50A should be begun by drawing line A B, and then C D must be very carefully placed. The remaining line will not give much difficulty if the others are right. In this exercise do not use any construction lines.

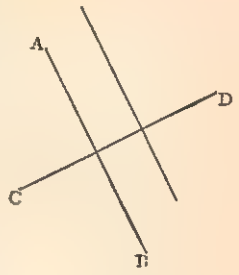


Fig. 50A.

Examination by Sample.—In Drawing Standard III. and the Standards above it, the work of the School is judged by sample tests. Several different kinds of drawing have to be learned, but each scholar will only be examined in one, and the Inspector, on examination day, settles what sort of drawing each shall execute.

In Standard III. the candidates are divided into two divisions by the Inspector. One division works with the ruler, the other does Freehand without it. In Standard IV. the candidates are also divided into two divisions, one taking Freehand, the other Drawing to Scale. The plan is similar in the higher Standards, but candidates who work for certificates have to do all the three divisions of these Standards.

During the year each pupil must be taught all the work, but before the examination the teacher should carefully notice which are most skilful in each subject. On examination day these should be scattered about among the rest, so that in whatever way the Inspector divides the class, there will be picked scholars in each division. Some teachers place all the best in Geometry together, all the best in Freehand together, and so on. This is not a good plan, as by the Inspector's

arrangement each scholar may have to do that drawing for which he has least skill.

Some teachers place those who are skilful in Model Drawing in the front desks. Inspectors, who are aware of this plan, cause these to change places with some behind.

Drawing Standard III.—From twenty to thirty minutes are allowed. There are several ways in which the tests in this Standard are given. Some Inspectors give a copy on a card to every candidate. Others give a copy to each candidate in one division and place a large copy on the black-board for the other division. Another plan is not to give out any cards, and in this case large copies are placed on the black-board, or the Inspector draws the copy himself or allows it to be drawn by the teacher. If the Inspector draws the copy himself, it may be necessary to ask him to be good enough also to explain what is required to be drawn.

Freehand.—Besides the usual copies which have both sides alike, some irregular forms are given, such as the plum represented inside the cover of Book 3 of Ablett's Series. Such irregular shapes cannot be well drawn if the pupil relies solely on the mechanical help that may do well enough for balanced ornamental forms. Practice in the Memory Drawing, Book 20 of Ablett's Series, will here be found helpful.

Simple Geometrical Figures with Rulers.—Among the figures shown in the Illustrated Syllabus, and reproduced inside the cover of Book 4, Ablett's Series, are a hexagon and a pentagon. *In teaching these the following methods are useful:—*

Hexagon.—This may be drawn by making an equilateral triangle first (as Fig. 22, Book 4, Ablett's Series). Simple measurement will then give the hexagon. Another method is that shown below.

Figs. 51, 52, 53, 54, show the various steps in forming the hexagon, beginning by making an equilateral triangle. When

the hexagon is complete (Fig. 54), the length of the sides and the angles should be carefully compared and any necessary corrections made. Lastly rub out the dotted lines of Fig. 54.

Pentagon. First Method.—A B (Fig. 55) is one side of the


Fig. 51.


Fig. 52.


Fig. 53.

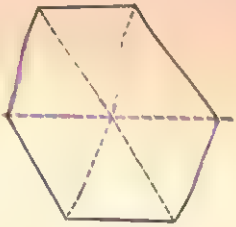


Fig. 54.

pentagon. Draw the perpendicular C D from the middle point of A B. Hold a pencil point near D, and with the other hand

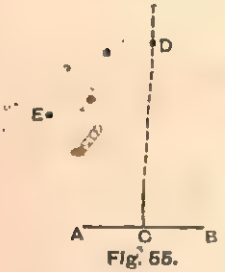


Fig. 55.

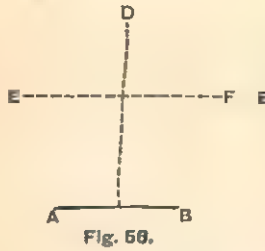


Fig. 56.

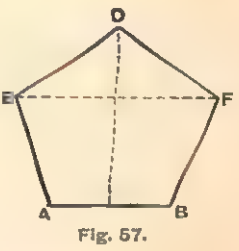


Fig. 57.

hold a pen or pin with its point at E. Move these two points about until E A and E D seem to be equal to A B. Mark E and D. The rest follows as in Fig. 56 and Fig. 57.

Second Method.—A B (Fig. 58) is a side of the pentagon. Make C X equal to A B and X D a trifle more than half C X. D will be the highest point of the pentagon. In Fig. 59, L N should be marked off so as to be a very little less than 3 times L A. Draw A N and make A E equal to A B. B F is obtained in a similar way. Fig. 60 shows the completed pentagon. Finally rub out the dotted lines.

If each pupil is provided with a copy or a card in the examination, the drawing must be made somewhat larger than the copy.

Fig. 61 is an exact representation of a copy, to be drawn with

Fig. 58.

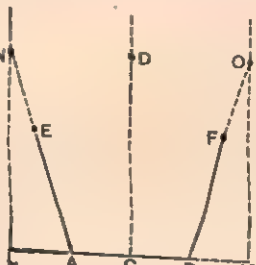


Fig. 59.

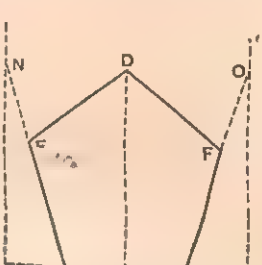


Fig. 60.

a ruler, set in the examination. One side of the larger equilateral triangle is $2\frac{5}{8}''$. It will be well for the candidates to

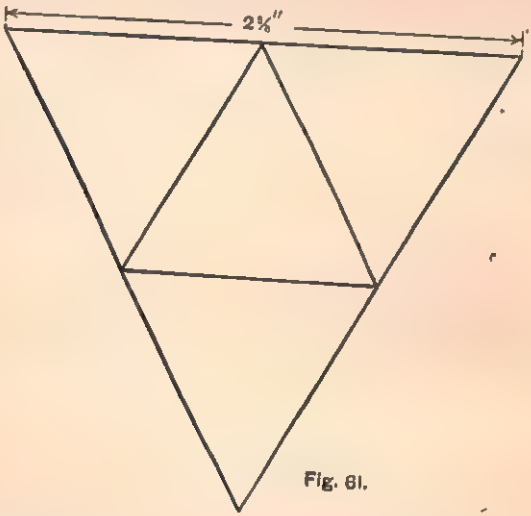


Fig. 61.

represent the $2\frac{5}{8}''$ by $3''$. By this plan the copy is enlarged and a measurement used which is easy to remember.

Drawing Standard IV.—From thirty to forty minutes

is allowed in the examination, for the work of this and the higher Standards.

Freehand.—The drawings should be large, and it is better not to line in at all than to spoil the shape, which is the main thing to draw well, by dragging shaky, wiry, and inartistic lines over the whole as a final process. The short-sighted boys are sometimes required to draw from cards. Some teachers think that these are more difficult than the copy placed on the black-board, so they place the short-sighted boys in the front row where they can see the large copy on the black-board.

Simple Scales and Drawing to Scale.—The *scales* are very often badly done in the examinations, because teachers underestimate the necessity of giving thoroughly careful practice in this branch of the work.

A scale should be figured as shown in the diagram, Fig. 62,

Fig. 62.

as this is the most convenient marking for taking measurements from it.

To take off 3 yards 2 feet, put one point of the compass at 3 and open its legs until the other point comes on the 0, which indicates 3 yards. Keep the point on the 3 of the yards and move the other point from 0 to the 2, which indicates feet. Then the distance between the two points of the compass will be 3 yards 2 feet.

In the Illustrated Syllabus the scales shown are those of feet represented by inches or parts of inches.

In the examination, candidates may be asked to represent yards, furlongs, chains and miles, and must be practised in such scales.

There are different ways of stating what is wanted, as shown by the following questions:—

Draw a scale showing 2′ 7″ *to* a scale of 1½ inches to 1′.

Draw a scale showing 3′ 1″ *on* a scale of 2 inches to 1′.

The *Drawing to Scale* also needs careful attention, and is of more practical value than any other kind of drawing.

The examination tests are worked either on plain paper or paper divided into squares each of which has a side ¼″ long.

Before working a problem the candidate should look for the longest dimension and ascertain which way of the paper will give space enough for it.

In using the squared paper each side of a square will have to represent some given distance. In one problem this may be ½″, in another 1″, in another 2″, and so on according to the directions given in the question.

Drawing Standard V.

Freehand.—In drawing the irregular forms, such as the vine leaves, shell, &c., it is most important that the main proportions and lines be carefully set out before the details, such as the serrations, be drawn. If this precaution be not taken, the drawing will probably be as shapeless as a map when it is drawn without the help of the lines of latitude and longitude.

Model.—Care should be taken to ascertain that every candidate has an unobstructed view. It sometimes happens that candidates are so seated that they cannot see the object which they have to draw.

Large common objects are often put up as a test by the Inspector. In drawing the horizontal lines of such objects as easels, cupboards, doors, and the like, mistakes are often made, especially when these lines are above the level of the eye.

Horizontal lines which are below the level of the eye, appear to slope upwards from the point nearest to the eye, but horizontal lines which are above the level of the eye, appear to slope downwards from the point nearest to the eye. This may be readily seen by holding a pencil horizontally between the

eye and the top and bottom of an open door. Candidates who have been practised only in drawing objects below the level of the eye will be almost certain to draw the top of a door, large cupboard, or easel with its horizontal straight lines sloping upwards. This mistake is likely to be fatal to the chance of success.

Practical Geometry.—Nothing makes success more sure than working problems from memory. One problem at least should be drawn in this way at each lesson. It is very important to provide accurate instruments. The problems have sometimes to be drawn to a given scale, so that the knowledge of drawing to scale, which has been gained in Standard IV., must not be allowed to slip away.

Drawing Standard VI.

Freehand.—The copies given in the examination are not very complicated, but yet more difficult than those of Drawing Standard V., because the curves are of a more refined and subtle character.

Model.—The prism with hexagonal ends and one of the earthenware red vases are often placed as a group for examination purposes. Careful practice is needed to enable a candidate to draw these well, as they are by no means easy.

Solid Geometry.—Candidates who do not thoroughly understand the simple principles of the subject have but a poor chance of gaining success in the examination.

Pages 2, 3, 4, 5 of Book 15, Part I. of Ablett's Series, should be thoroughly mastered.

If the Inspector will permit it, each candidate may be allowed a small cube of soap from which to cut the figure of which the section is required. With the real shape at hand it is comparatively easy to understand a question.

Drawing Standard VII.—The teacher need not have much trouble in preparing pupils for this.

If the candidates are provided with Books 16, 17, 18, 19 of Ablett's Series, they will be able to prepare themselves with occasional assistance. This does not, however, apply to Shading.

For shading practice, the cast must be placed with a strong side light falling on it. To secure this the cast should be placed near a window which has the bottom panes blocked with sheets of brown paper or a cloth. A curtain should also be hung up to keep the light from the other windows from falling on the cast. The shadows must be distinctly marked out, and by only one source of light, otherwise the shading is very undefined and difficult to represent.

Examination for Certificates.—It is very necessary to ensure that the candidates have full time for the work. In order to get this they should begin work directly the Inspector arrives, and the time of beginning and giving up each paper should be noted.

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